Ex. Doc. No. 19.

HOUSE OF REPRESENTATIVES.

COMMERCE OF THE LAKES AND WESTERN RIVERS.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING

In compliance with a resolution of the House of Representatives of December 22, 1847, a copy of the report of the Bureau of Topographical Engineers, in reference to the Commerce of the Lakes and Western Rivers.

JANUARY 12, 1848.

Read, and referred to the Committee on Commerce.

WAR DEPARTMENT,
Washington, January 6, 1848.

SIR: In compliance with a resolution of the House of Representatives of the 22d ultimo, requiring the Secretary of War to furnish the House "with a copy of the report from the Bureau of Topographical Engineers, in reference to the commerce of the lakes and western rivers, made in conformity with a resolution of the Senate of the 15th of January last," I have the honor to transmit, herewith, a communication from that bureau, with a copy of the report required.

Very respectfully, your obedient servant,

W. L. MARCY, *Secretary of War.*

Hon. R. C. WINTHROP,
Speaker House Representatives.

BUREAU TOPOGRAPHICAL ENGINEERS, *Jan.* 5, 1848.

SIR: In answer to a resolution of the House of Representatives of the 22d ultimo, I have the honor of transmitting, herewith, a copy of a report from this bureau, "in reference to the commerce of the lakes and western rivers, made in conformity with a resolution of the Senate of the 15th of January last."

With great respect, your obedient servant,

J. J. ABERT, *Col. Corps Top. Engineers.*

Hon. W. L. MARCY, *Secretary of War.*

IN THE SENATE OF THE UNITED STATES,
January 15, 1847.

Resolved, That the Secretary of War communicate to the Senate such information as may be in the possession of his department on the following subjects:

1. The commerce of the lakes, and its probable increase.
2. The same of the western rivers.
3. The population depending upon the lakes as a means of communicating with a market.
4. The amount of tonnage employed upon the lake trade; distinguishing, as far as practicable, between steamboats, propellers, sailing craft, and number of hands employed in the trade.
5. Facilities of communication, by railroad and canals, with the Mississippi and the Atlantic.
6. Adaptation of the commercial means of the lakes to purposes of defence, and of military operations generally.
7. Extent of lake coast; and of the same in the different States and territories; harbors in this extent; their condition and usefulness, and a comparison of their present condition with that before improvements were made.
8. Means of communication in the British provinces, by roads and canals, with their ports and harbors on the lakes, and the condition of the latter.
9. Adaptation of the British commercial means of the lakes to the purposes of military operations generally.

Attest: ASBURY DICKINS, *Secretary*.

BUREAU OF TOPOGRAPHICAL ENGINEERS,
Washington, *December* 10, 1847.

SIR: I have the honor to acknowledge your direction to report upon a resolution of the Senate of the 15th January, 1847, a copy of which is hereto prefixed.

When the resolution was received, this office possessed but limited means of answering its several inquiries. Circulars in great number were, however, immediately addressed to persons informed on these subjects, and from the answers and from the documents, periodicals, and pamphlets, in the possession of the bureau, I have been enabled to make the following report. The subjects of the resolution open a wide field, in which speculative opinions may be extensively indulged; but, I have endeavored, with great care, to avoid such a course, and to limit myself to presenting a condensed exposition of the matter, facts, and consequences, called for by the resolution. Under these views each item of inquiry will be reported upon separately, and in regular course of the resolution.

In order to illustrate the report, a skeleton map of the lakes, and of their connection with the western rivers, has been made, and is appended to the report.

"1.—*The commerce of the lakes and its probable increase.*"

The absence of any established system of statistics in reference to our internal commerce, will, until so serious a defect in our national policy be adequately remedied, render it extremely difficult to answer questions of this kind with the precision due to their intrinsic importance, and to their eminent influence upon the prosperity of the nation. The internal commerce of all nations vastly exceeds their external, and is a more infallible measure of their strength. It is only from a knowledge of this commerce, which is a knowledge of the products of all kinds of a country, and of the interchange of these products, that the capacity of a country can be properly estimated; its ability to sustain itself in seasons of adversity, and to lend a helping hand to others. And it is, also, from a knowledge of these products, that a sound judgment can be formed of those national interests which may require some adventitious aid, and of those which ably sustain themselves. Or, in our intercourse with other nations, that the statesman can decide upon the position which his country can take, from a correct knowledge of her own resources, and of her own consequent independence. A nation may be obliged to endure a wrong, or be able to resent it, according to the condition of her internal resources, for on the strength of these her ability to resist chiefly depends. The productive industry of a nation may be considered as measured by its internal and external trade and commerce, and the external trade and commerce may be considered as the measure of national profit; as the external commerce of a nation consists of those national products which are not wanted at home, or which can be conveniently spared. Each react upon the other, giving life and strength to both; a correct knowledge of each is therefore of the greatest importance in obtaining a correct knowledge of the whole. Our revenue system gives us an exact knowledge of that portion of our productive industry which forms our foreign commerce; but the system has not been extended so as to obtain a knowledge of our internal trade and commerce. This immense amount of national resources, and this vast measure of national strength, has, as yet, been left, that is, a corrrect knowledge of it, to individual efforts, and to accidental investigation; or, in other words, it is yet in want of some established system by which its details can be collected with the same reliable accuracy as those of our foreign commerce. Considering how essential this knowledge is to the forming of sound opinions of the fiscal or military power of a people, we think it will be readily admitted, that a system, by which this knowledge shall be obtained, cannot be too carefully established or too highly cherished.

In a report from this bureau of November, 1843, returns were submitted of the lake commerce from 1835 to 1841. These returns were necessarily imperfect, because of the absence of any system by which statistics of this kind could be collected. Yet by dint of great labor, and of numerous circulars to intelligent individuals who had given much attention to the matter, I was enabled to sub-

mit the returns of that report, exhibiting kinds and quantities, and the moneyed value of exports and imports.

Referring to these returns, it will be found that the moneyed value was—

Of imports	$33,483,441 00
Of exports	32,342,541 00
Making a total in 1841, of	$65,826,022 00

as the floating value of the lake commerce.

By reference to the official reports of the Treasury Department, the enrolled and licensed lake tonnage, for the year 1841, was 56,252 tons; and the number of mariners then employed, 3,750.

When the resolution of the Senate, upon which this report is made, was received, circulars were written in the hope of obtaining a regular series of returns from 1841 to 1846, inclusive; but, when it is understood that the greater part of the information of these returns has to be obtained from the books of mercantile houses, it will readily be perceived that the investigation was attended with serious difficulties, and with great uncertainty. No regular series of returns could be obtained, but from the information received, I am enabled to present the following table of the moneyed value of exports and imports for the year 1846.

Consolidated return of exports and imports of the lake harbors for the year 1846.

Oswegatchie (district)	$180,555 00
CHAMPLAIN.	
Whitehall	6,327,489 00
Plattsburg (district)	1,160,844 00
Burlington (district)	3,777,726 00
ONTARIO.	
Sackett's Harbor (district)	2,735,091 00
Dexter (port)	484,575 00
Salmon river or Port Ontario	423,724 00
Oswego	9,502,980 00
Big Sodus	39,206 00
Rochester	212,926 00
Pultneyville	20,342 00
Niagara (district)	606,863 00
ERIE.	
Black Rock	not known.
Buffalo (port)	48,989,116 00
Silver creek	not known.
Irving	not known.
Portland	not known.
Conneaut (port)	380,475 00

Ashtabula (port)	715,467 00
Fairport (Grand river)	819,584 00
Cleveland (port)	12,559,110 00
Huron	not known.
Sandusky (district)	5,943,127 00
Monroe (district,) including Toledo	9,519,067 00
Detroit	8,706,348 00
Erie	6,373,246 00
Dunkirk	not known.
Black river (port)	215,040 00
Vermillion (port)	137,770 00

MICHIGAN.

Chicago	3,927,150 00
St. Joseph	not known.
Grand river	not known.
Kalamazoo	not known.
New Buffalo	not known.
Michigan city	not known.
Mouth of Calumie	not known.
Little Fort	not known.
Southport	not known.
Racine	not known.
Milwaukie	not known.
Sheboygan	not known.
Manitowoc	not known.
	$123,829,821 00

There are several places of notoriety on the lakes enumerated in the above statement, but of which the exports and imports for 1846 are not known, because no returns have been received from them, or because the returns which have been received were too defective to be used. The foregoing amount may, therefore, be considered as below the true representation of the entire American lake commerce, and may be taken with safety as not an exaggerated value of that commerce. But there can be no doubt that the total exports and imports of these lakes, as represented in the above table, is a duplicate commerce—the exports of one place being the imports of another; it must not, however, be supposed as including a mere carrying trade, but as exports fairly shipped at a place, and as imports unloaded, and not being again involved as part of the lake commerce. Applying these considerations to the amount of commerce above stated, they will justify the assumption of half that amount as the net moneyed value of the lake commerce; or, in other words, that the net value of this commerce is, for the year 1846, $61,914,910. The same reasoning applied to the commerce of 1841 will make it, for that year, $32,913,011; showing the lake commerce to have nearly doubled itself in five

years, and to have experienced an average annual increase of $17\frac{62}{100}$ per cent.

The registered, enroled, and licensed tonnage of the lakes, by the official reports of the Treasury Department, was, for the year 1846, as follows:

		Tons.
Champlain district		3,192
Sackett's Harbor district		4,279
Oswego	do	16,046
Niagara	do	75
Genesee	do	769
Oswegatchie	do	2,058
Buffalo	do	24,770
Cape Vincent	do	2,230
Presque Isle	do	2,993
Cuyahoga	do	18,526
Sandusky	do	2,864
Maumee	do	3,163
Detroit	do	24,804
Mackinaw	do	1,067
Making a total of		106,836

From the same authority, (the official reports of the Treasury Department,) the tonnage of these districts amounted, in the year 1841, to 56,252 tons; showing that in five years the regular licensed tonnage of the lakes was nearly doubled, and that it experienced during that period of five years an average annual increase of $17\frac{98}{100}$ per cent.

The foregoing table is a mere exhibit of the licensed tonnage. The commerce of the lakes, in reference to amount of goods transported, must depend upon the frequency with which this tonnage is employed, or the number of trips made by it in one season. Referring to the authority of the Treasury Department, it will be found that the clearances in the districts above enumerated were, for the year 1846, 4,070, carrying 1,022,466 tons; and the entrances for the same year were 4,071, delivering 1,012,708 tons. But the statement of clearances and entries of the authority referred to omitted the important port of Buffalo. This omission is supplied from an interesting pamphlet upon the lake commerce, published by James L. Barton, esq., of Buffalo, in which the total number of clearances and entries for that port is put down at 7,714, and the total amount of merchandise delivered and received at 1,825,914; making for the whole (American) lake commerce—of clearances and entries 15,855, and of goods imported and exported for 1846 3,861,088 tons.

The amount of merchandise imported and exported in 1841 was 2,071,802; showing also that the amounts of tons exported and imported was in 1846 nearly doubled that of 1841, exhibiting an average annual increase of $17\frac{27}{100}$ per cent.

The striking coincidence in the average rates of increase from

1841, to and including 1846, of these several aspects under which the lake commerce has been considered, namely, its moneyed value, its licensed tonnage, and its tons of merchandise exported and imported, will, I hope, be received as some evidence of careful investigation, and will gain confidence for the facts reported.

It may be of some interest to determine the probable activity of the lake tonnage, or, in other words, the frequency of its trips, in transporting the amount of merchandise of all kinds which passes over the lakes.

We have seen that the total amount of this merchandise was, for the year 1846, 3,861,088 tons, and the total amount of American lake tonnage for the same year was 106,836 tons. It would not do to suppose that the American tonnage alone of the lakes was employed in the transportation of this vast amount of merchandise, as it would require a frequency of trips utterly incompatible with probability. The British tonnage, no doubt, has its share in the trade, and will have to be involved, in any reasoning, to determine the frequency of the employment of every ton of lake tonnage.

From authority to be relied upon, it has been ascertained that the entire British lake tonnage for 1846 was 46,575 tons. A part of this is exclusively a local tonnage, seldom if ever entering our ports, and not involved in that portion of the lake commerce which constitutes the amount of American export and import trade. Giving to this part of the subject the best reflections in my power, I am induced to place 30,000 tons of British tonnage as actively employed in the great trade of the lakes. We have, then, 136,836 tons of shipping employed in the transportation of 3,861,088 tons of merchandise, which will require each ton to make $28\frac{21}{100}$ trips the season.

The registered and enroled tonnage of the lakes for 1846 was 106,836. If it be supposed that the cost of constructing this tonnage (including all kinds of craft, steamboats, propellers, and sailing vessels) to average $50 the ton, the total cost of the shipping employed in the lake commerce will be $5,341,800. Estimates from highly intelligent authority make this item larger. Mr. Barton, of Buffalo, places it at $6,000,000, and the annual expenses for wages, wood, coal, provisions, current repairs, &c., (exclusive of insurance and interest upon the capital,) at $1,750,000.

A very important item in the commerce of the lakes, which has not yet been noticed, is the passenger trade. The extent of this trade is to be ascertained with some accuracy, though not without much labor and industry. Mr. Barton, whose connexion with the Steamboat Association of the Lakes gave him great advantages, and who has investigated this, as well as other subjects connected with the lake commerce, with great care and for many years, states the number of passengers in all directions, for the year 1846, at "not less than 250,000." To state the value of the trade is also not without difficulty, from the various distances travelled, various condition of passengers, and consequent variety of charges and expenses. But after giving the subject a most careful investigation, I am induced to place the average charges upon each passen-

ger, on all accounts, at $5, which will give for the value of this item of commerce an amount of $1,250,000.

The number of mariners employed in 1846 was, by the Treasury Department returns, 6,972.

"*Probable increase.*"—It is difficult to approach this part of the inquiry without fear of appearing to exaggerate. Those who knew these lakes thirty years ago, and who know them now, will admit that existing facts have baffled human anticipations, and that the wildest speculations of the imagination have been more than realized in the vast increase of their commerce. Then, if we examine into the elements of this increase, we can perceive no reason to doubt a less energetic action of these elements, for many years to come, than has been realized in the past. The regions whose intercourse is facilitated by this commerce; the productiveness of the soil of the adjacent States, extent of that soil, and extent of lands yet unoccupied; the population depending upon the lakes as a means of communicating with a market already great, and daily increasing; the agreeableness of the climate and its general salubrity; the character of the population and of the foreign emigrant, to whom the lake region is so great a favorite; the cheapness of the land—all these elements of increase now exert as great energy as heretofore, and must continue to exert an equal energy for many years to come. If it be supposed, that merely for the ensuing ten years, the increase will be equal to that of the last five, it will justify the following results. We have found that increase under all the aspects in which the trade has been viewed, to exceed the annual average of 17 per cent. We will take 17 per cent., and apply it to the net amount of the commerce of 1846:

That commerce has been shown to be.....	$61,914,910
To which, add the passenger trade of.....	1,250,000
And we have a total of.....	63,164,910

This amount for ten years, at 17 per cent., will be, in 1857..... $170,545,257*

I can see no reason to doubt the correctness of this estimate, and feel under no apprehension of being reproached for exaggerating, after ten years shall have passed away.

2.—"*The commerce of the western rivers, and its probable increase.*"

I have found it extremely difficult to obtain exact information on this head. It does not appear to have attracted as much and as early attention as the trade of the lakes, or to have had as many engaged in collecting and reporting its details, probably on account of its palpable and vast extent, which, visible to every observer, was considered sufficiently notorious without the formality of record. Circulars were, however, written to all those whose official position or literary reputation induced the belief that they

* The net value is alone involved in this amount, that is, half of the aggregate value of imports and exports.

could furnish the desired information; but the answers have too generally disappointed expectation, and my chief reliance is upon the records of our daily and periodical journals, upon the matter collected and reported in the Cincinnati memorial of 1842, and other papers of that kind. This memorial is the result of a meeting held at Cincinnati, for the purpose of addressing Congress "on the subject of removing obstructions from the western waters." A committee of seventeen highly informed persons were appointed to draw up the memorial, upon which, it is evident, they bestowed great labor of investigation and care of research.

From official returns of the Treasury Department, it appears that the steamboat tonnage of the western rivers for the year 1842, was as follows:

New Orleans	80,993
St. Louis	14,725
Cincinnati	12,025
Pittsburg	10,107
Louisville	4,618
Nashville	3,810
Total	126,278

and, from the same authority, the steam tonnage for 1846 amounted to 249,055.

This is given as the entire steam tonnage of the western rivers, as well that employed on the local or way commerce, as that employed between the different ports and New Orleans.

There are no official returns of other kinds of tonnage, but the Cincinnati memorial supposes there are 4,000 boats of other kinds (not steamboats) employed on these rivers, which carry on an average 75 tons each, making 300,000 tons. This amount added to the steamboat tonnage, will give for the year 1842, for the total tonnage of all kinds employed on the western rivers, an aggregate of 426,278 tons.

The flat-boat navigation of these waters is altogether a down-stream navigation, the boats at the end of a voyage being generally broken up and sold. They are yet, however, used to a great extent, as they consume much of the spare timber of the country and furnish a cheap freight. It would not, I think, be unreasonable to suppose that two series of these boats are used in a year; and from various circumstances connected with them, there can be no doubt that they generally carry a full freight. According to this last supposition, the amount of produce of all kinds carried to market by these boats in one year is 600,000 tons.

The steamboat navigation is of a different character. It is repeated as often as the condition of the boat, the season of the year, and the state of the waters will admit. Taking into consideration these circumstances, and making allowance for the reflection that these boats are not always loaded to their full capacity, we will suppose that the steamboat tonnage is repeated ten times a year, or that there are ten trips of the steam tonnage from its landing places

to New Orleans. This supposition will give for the steamboat freight of a year 1,262,780 tons, or a total of merchandise (exclusive of the way trade) transported on the western rivers, for the year 1842, of 1,862,780 tons.

The next question is to determine the probable moneyed value of this commerce. For this we have no direct data, but have to resort to inference and comparison. It is well known that a great portion of the produce of the west is of a much greater value per ton than that of the lakes. But if to obtain its value, it be assumed as of no greater value per ton than the commerce of the lakes, we shall clearly show, we think, the absence of all efforts to exaggerate.

The total tonnage transported on the lakes has been shown to be 3,861,088 tons; but this is a duplicate quantity. It exhibits the total amount of exports and imports at all places, and is, therefore, in all probability an exhibit of double of the real amount of tons of merchandise. Assuming this supposition as correct, the net amount of tons of lake goods transported is 1,930,544; and as it has been shown that the net value of these goods is $61,914,910, we have for the net value per ton $32 07.

It has also been shown that the net tons of merchandise of the western rivers, with New Orleans, exclusive of way trade, was for 1842, 1,862,780 tons. Now, if we apply to this amount the value of lake commerce, per ton, as just given, we shall have for the direct commerce of the western rivers, with New Orleans, an amount of $59,739,354.

New Orleans being the point at which this commerce is concentrated, the returns of that place would merely duplicate the commerce, they have, therefore, not been used. But these returns would, also, from the same reason, be highly corroborative evidence of the amount.

Referring to the official returns of the amount of exports and imports of New Orleans for the year 1842, we find them to be $50,566,903, a sufficiently adequate coincidence with the river trade, as just given, to sustain the probable accuracy of the suppositions which have been adopted in reference to that trade, and to justify the amount of exports and imports of New Orleans in being taken as an exhibit of the commerce of the western rivers with that city.

For 1842, then, this commerce can be stated at.....	$50,566,903
In 1846, a statement from the Treasury Department makes it.....	62,206,719
Showing an increase in four years of.....	$11,639,816

or, an average annual increase of $5\frac{3}{4}$ per cent.

We have, as yet, spoken only of the direct river commerce, and not of the indirect or way commerce, of that immense amount of commodities which is interchanged between city and city, town and town, place and place, on the western rivers, and which forms no part of the New Orleans commerce, but which may be appropriately designated as the coasting commerce of the western rivers.

"The shores of the Mississippi," says the Cincinnati memorial,

"on both sides, from the mouth of the Ohio downwards, receives supplies of live stock, provisions, machinery, farming implements, cabinet ware, and a great variety of fabrics from the more northern States of the great valley."

"A still more important addition is the trade which passes from town to town, and from State to State, throughout the west, and which is independent of what are termed exports and imports. It is difficult to form any adequate idea of this trade, but we, who see it going forward, and witness the gigantic means required to keep it in operation, know that it forms a large item in the estimate of our trade and industry." Then, after enumerating the items and the trade of places upon which its judgment is founded, the memorial adopts the conclusion that the aggregate of this way trade, or interchange of commodities, is "seventy millions" in addition "to the fifty millions exported through New Orleans."

Upon the authority of the Cincinnati memorial, we shall, therefore, adopt for the way commerce for the year 1842, the amount of $70,000,000.

To bring this amount up to 1846, we will apply to it the same average rate of increase, $5\frac{3}{4}$ per cent., which the direct river commerce has been found to experience, and the result will be (for 1846) $86,100,000.

From the foregoing exposition then, the total commerce in merchandise of all kinds, of the western rivers, can be stated for the year 1846 at (net value) $148,306,719.

This amount should be strictly understood as indicating the net value; the floating value cannot be less than double this amount, (the exports of one place being the imports of another,) or equal to $296,613,438 for the year 1846.

The passenger trade of this river is very great. I am, however, without any means of stating it, except by comparison and inference. It is fair, I think, to suppose that the passenger trade is confined exclusively to the steam tonnage. The steam tonnage of the lakes is 60,825, and the value of the passenger trade for that tonnage is stated at $1,250,000.

The steam tonnage of the western rivers is stated, for 1842, at 126,278 tons.

This tonnage would, therefore, yield, in the same proportion, for its passenger trade, an amount of $2,595,108, then, to bring the amount up to 1846, at an average yearly rate of $5\frac{3}{4}$ per cent. it will be $3,191,982, or, the total commerce of the western rivers is, for the year 1846, $151,498,701.

The cost of the steamboat tonnage employed in this trade is stated to be $80 the ton, which makes the total cost..	$10,102,240
Add for the cost of the craft employed in the trade (Cincinnati memorial).....	420,000
Making the total cost of all the river craft in 1842...	$10,522,240

Supposing it to have undergone the same ratio of increase, $5\frac{3}{4}$ per cent., it will amount, in 1846, to $12,942,355.

The yearly expense of sustaining this craft, and keeping it in activity, is stated by the Cincinnati memorial to be, for steam craft..... $15,039,709
Other craft..... 1,380,000

$16,419,709

which, at an average increase of $5\frac{3}{4}$ per cent., would be, for the year 1846, $20,196,242.

From the most careful calculation of the hands employed in those boats as mariners, (not shore employees,) the steamboats have..... 8,418 hands.
All other kinds of craft..... 12,000

Total, 1842..... 20,418

which, at the increase which has been assumed, of $5\frac{3}{4}$ per cent. per year, will amount, in 1846, to 25,114.

These amounts are, however, too small. They do not, in my judgment, exhibit a just value of the commerce of the western rivers; the internal or coasting commerce of those rivers. The chief error arises from attributing to this internal commerce no greater ratio of increase than that which the commerce of New Orleans has experienced. A different view will now be taken, in which this cause of error will be eliminated.

It has been previously shown that, from the reports of the Treasury Department, the steam tonnage of the western rivers was, for the year 1842..... 126,278 tons.
And for the year 1846..... 249,055

Making an increase in four years of..... 122,777 tons, or nearly 100 per cent., or an average of $24\frac{3}{10}$ per cent. But as the direct trade with New Orleans did not experience, during the same period, a greater average annual increase than $5\frac{3}{4}$ per cent., this vast increase of the steam tonnage of these rivers must be owing chiefly to the vast increase of the way or internal river commerce. Throwing fractional parts out of consideration, and deducting for the direct New Orleans trade, these facts will prove that the way commerce of the western rivers, has experienced, since the year 1842, a regular average annual increase of 19 per cent.

Now, taking the data of the Cincinnati memorial as correct, namely, that the way commerce of the western rivers amounted, in 1842, to $70,000,000, it will, at this rate of increase, be, for the year 1846..... $123,200,000
Add to this the trade of New Orleans for the same year, namely..... 62,206,719

And we have a total (exclusive of passenger trade) of 185,406,719

If we now treat the passenger trade, in reference to the foregoing exposition of steam tonnage, it will justify the following results:

The steam tonnage of the lakes gave a passenger trade of $1,250,000. This tonnage was 60,825, therefore, at the same rates, the steam tonnage of the western rivers, which, for 1846, was 249,055 tons, should give, for the passenger trade of that year, an amount of $5,118,269; taking therefore, these three items, namely, New Orleans trade, way trade, and passenger trade, we have for the gross amount, for 1846, $190,524,988.

Our first view of the subject made these items $151,498,701.

A third view may be taken, in order to obtain some accurate expression of the value of the commerce of the western rivers.

The steamboat tonnage of these rivers, for 1846, has been shown to be 249,055. This includes the whole tonnage, as well that engaged in the New Orleans trade as that engaged in the coasting river trade. But the value of the merchandise of the two trades differs greatly—that for New Orleans being of a much greater value per ton than that of the coasting river trade. Of the New Orleans trade, an exact value has already been stated; the object will now be to determine the value of the coasting river trade. Deducting one-fifth from the above tonnage as the proportion which can, with propriety, be considered as exclusively employed in the New Orleans trade, it will leave for the river trade 199,244 tons. Then, supposing this tonnage to be as actively employed as the tonnage of the lakes, it will give $28\frac{21}{100}$ trips per ton the year, or the transportation of 5,620,673 tons per year. This, however, should be viewed as a duplicate tonnage—the exports of one place being the imports of another. The net amount of transported goods will therefore be ..... 2,810,336 tons.

To this amount there should be added, for the flat and keel boat navigation	600,000	"
Making a total of	3,410,336	"

It has been previously shown, that the value of the lake commerce is $32 $\frac{07}{100}$ per ton. It will, I presume, not be considered unreasonable to suppose the coasting river trade of the western rivers to be of an equal value, per ton, of the lake trade. Now, applying this supposition to the above tonnage of goods, we have,

for its moneyed value	$109,369,475
Add for the New Orleans trade, as already determined	62,206,719
Add for the passenger trade	5,118,269
Total	176,694,463

We have now three expressions for the value of the trade of the western rivers, with the data for each.

First	$151,498,701
Second	190,524,988
Third	176,694,463

I have already said, and given reasons for so saying, that the first is too small. Taking the second and third as nearer approximations to the truth, and using the mean of these two, the amount is $183,609,725. I shall, therefore, assume this mean as a reliable exposition of the commerce of the western rivers for the year 1846. I again desire it to be understood that the foregoing is an expression of the net value of the trade, free from the duplicating which results from the importation of one place, being the exportation of another.

The Cincinnati memorial represents the population of the great valley—a population which can be considered as depending upon these rivers as a means of communicating with a market—for the year 1842, at 6,461,892, which, at the average increase of population throughout the United States of 3.41 per cent., will make the population so situated, for 1846, amount to 7,343,292.

I do not make the population as great, probably from a more rigid definition of the region depending upon the western rivers* as a means of communicating with a market. Embracing all of the west which can, in my judgment, be placed in that category, and taking the census of 1840 as a guide, or the census by States of a later date, where it can be had, I have made out the following results:

1. Pennsylvania, one-sixth of its population	287,339
2. Virginia, one-eighth of its population	154,947
3. Ohio, (all, except parts depending upon the lakes)	796,348
4. Indiana, (all, except parts depending upon the lakes)	435,605
5. Arkansas, all of its population	97,574
6. Louisiana, all of its population	352,411
7. Mississippi, two-thirds of its population	250,434
8. Tennessee, all of its population	829,210
9. Kentucky, all of its population	779,828
As per census of 1840	3,983,696
To which add, for the annual average increase of 3.41, in order to bring it to 1846	815,064
	4,798,760
10. Illinois, (all, except parts depending upon the lakes)	520,786
11. Wisconsin, the same—census of 1845	38,819
12. Missouri, the whole—census of 1845	511,937
13. Iowa, the whole—census of 1845	81,920
	1,153,462
Add for the foregoing ratio, for one year, to bring it up to 1846	39,333
	1,192,795

* It may be proper to remark, that by the term "western rivers," is meant the Mississippi and its direct and indirect tributaries.

Now adding the amount previously ascertained, of States, from the census of 1840 4,798,760

And we have, as the aggregate 5,991,555

There is also a portion of Alabama (North Alabama) which should be added to the above amount, embracing at this time about 200,000 inhabitants; making, as the total of population depending upon the western rivers as a means of communicating with a market for the year 1846, 6,191,555.

The above result may probably be objected to, on the ground that the general average increase throughout the United States, which has been applied to the census of 1840 to determine the population of the great valley for 1846, is too small a ratio for that portion of the country. It no doubt is so in reference to parts of the great valley, and to recent States of the valley, which, from various considerations, have experienced a rapid and great increase. But much of this increase is rather a change of population from one part of the valley to another, than an actual increase of population to the whole; yet, however, it cannot be doubted, that the population of the great valley has increased at a much greater ratio than that of the United States generally, and, therefore, that our calculation exhibits less than the real result. In order to get at a nearer approximation to the real population for 1846, I have taken the relative proportions of the population of those States which have had a census for 1845, and then of those States of which the census is not later than 1840—adding, in order to bring the calculation up to 1845, the ratio of increase which each State experienced from 1830 to 1840, and then adding for one year the average applicable to the valley States only, I find that the population depending upon the western rivers, as a means of communicating with a market, may be stated for the year 1846 at 6,576,027, and that the rate of increase from 1840 to 1845 may be fairly stated to be about 5 per cent.

"*Probable increase.*"—In order to avoid the appearance of indulging in even a legitimate and sound exercise of the imagination on this head, I will endeavor to submit briefly some of the principal elements upon which this increase depends.

The valley of the Mississippi, the great valley which constitutes the drain of that immense region of country lying between the Alleghany and the Rocky mountains, may be considered as embracing about 1,000,000 square miles. If it be supposed that two-thirds of this extent is good arable land, we have 666,666 square miles of good land, adapted to sustain the wants of society, and to yield its abundant harvests. "In the more fertile parts of Europe, (see Democratic Review, vol. 15, page 12,) the population of the present time averages 110 persons for every square mile." Now, as we have reduced the square miles of the "great valley" to that number which may with great propriety be considered its "fertile part," we do not apprehend error in assuming for its probable ability to sustain population a capacity equal to that of the

"more fertile parts of Europe." This supposition will give 110 persons for every square mile, or, for the whole 666,666 square miles, a population of 73,333,260.

But the remark of the Democratic Review is understood as referring more particularly to the agricultural regions of the continent of Europe. The valley of the Mississippi is somewhat different; not merely agricultural, but eminently manufacturing and commercial. A more just reference could, therefore, be made to the population of a people possessing similar habits and advantages.

The area of Great Britain is 119,924 square miles, with a population of 26,702,445, or of 222.6 for each square mile.

The area of France is 203,735 square miles, with a population of 33,640,000, or of 165.1 for each square mile.

According, then, to the population of Great Britain, the "great valley," excluding one-third of its lands as bad, is capable of sustaining a population of 148,399,851; and according to the population of France, it is capable of sustaining 110,066,556. But if the singular fertility of the valley of the Mississippi be considered, it is no doubt capable of sustaining numbers vastly greater than those we have stated.

From these data, the future prospects of the valley of the Mississippi may be calculated. Time, great time, will, without doubt, have to elapse before the population of that region will approximate to near the least of the foregoing numbers. But to bring the mind to a period which the greater part of the present generation will live to see realized, the subject will be treated differently.

It has been previously shown that the population of the great valley—that is, the portion of it depending upon the Mississippi and its tributaries as a means of communicating with a market—amounted, for the year 1846, to 6,576,027, and that its ratio of increase since 1840 may be fairly stated at 5 per cent. Now, applying this ratio to specific periods, using each as a census period, I find myself justified in the following results:

Population of 1846	6,576,027
Population for 1850	7,891,232
Population for 1860	11,836,848
Population for 1870	17,775,272

There is undoubtedly a fixed relation between the increase of population and the increase in results from the labor and occupations of man. I am not aware that this question of national economy has yet received that extent of investigation which would justify the adoption of reliable rules. It has been handled, with his usual acuteness, by Professor Tucker, in his work on the progress of the United States. He makes the proportion as 50 to 31, but he involves in his calculation the variation in the value of land. Separating that part of it from his elements, the proportion will be as 48 to 30, or as 24 to 15, or as $1\frac{9}{15}$ to 1, or, the increase of population being 5 per cent., the industrial occupations of society would be 8 per cent.

This ratio is much less than the commerce of the western waters

has experienced. Comparing the ratio of increase at New Orleans with that of the river commerce since 1842, and taking the mean between the two, I find that the combined annual ratio of increase of the whole commerce from 1842 to 1846 is 12.37 per cent.

I have no doubt that the commerce of the western rivers will feel the advantage of this high ratio for many years to come, as the commerce of these rivers, as well as that of the lakes, is a commerce due to a greater population than that depending upon them as a means of communicating with a market. The whole Atlantic commercial region is interested in, and a participator in this commerce. The cities of Baltimore, Philadelphia, New York, and Boston, are all extensive participators. But to avoid any appearance of a desire to exaggerate, as amounts on the most limited view are enormous, in order to determine the probable future increase of this commerce, the ratio of 12.37 per cent. will be applied only from 1846 to 1850, and then, to coincide with the population periods before stated of 1860 and 1870, the ratio of 8 per cent. will be applied. Making the calculation in conformity with these views, on the sum of $183,609,725, the commerce of the western rivers will be—

For 1850	274,459,816
For 1860	494,027,668
For 1870	889,249,802

In addition, however, to facts of population, of quantity of lands, and of their consequences, there are other elements in the commerce of a people which seriously influence its amount. These consist in the facilities, natural and artificial, of a country to communicate with a market. The natural facilities are in its water courses; the artificial are in its improved water courses, its roads, and canals. These artificial facilities add also to the development of the resources of a country by the addition they make to the useful period of human life. There can be no doubt that the rapid interchange of place which steamboats and railroads occasion, from the saving of time, which would otherwise be expended and wasted in travelling, gains in the average to the life of a business man of sixty, five years of his existence, and enables him to devote that much more time to his occupation. These causes cannot fail greatly to increase and rapidly to develope the resources of a people with whom they exist. The proportion in which they act upon these resources must be left to the development of future statistics.

The Mississippi river is the great natural drain of the immense valley which bears its name. The length of this river now navigable for steamboats, with but partial impediments, may be considered as extending from its mouth to the Falls of St. Anthony—a distance of about 2,000.

Assuming the Mississippi as the great central drain, other rivers will be spoken of as tributaries. And taking the western bank, we have—

1st. *The Red river*—a fine, navigable stream, with some obstructions, however, which pushes its head waters near to the Rio

Grande, and is represented upon good authority to have two feet of water as high up as old Fort Wachita—a distance of 1,500 miles, by the river route, from its junction with the Mississippi. It is now used in the steamboat transportation of government supplies, for 1,000 miles, by the river, to Fort Towson.

2d. *The Arkansas*—with a steamboat navigation of 600 miles. Both the Red river and the Arkansas have important tributaries, extending far into the country, and furnishing good flat boat navigation.

3d. *The Missouri*—with a periodical steamboat navigation of about 1,800 miles, and several important tributaries, furnishing good flat boat navigation. From thence to the head navigable waters of the Mississippi, there are several fine tributaries, adapted to steamboat and to flat and keel boat navigation.

Now, proceeding down the Mississippi on its eastern bank, there are many fine rivers, furnishing good and extensive flat and keel boat navigation for many miles; but the first river on that bank, proceeding downwards, which can be considered as a steamboat river, is the Illinois. It enters the Mississippi about 40 miles above St. Louis, and has a good steamboat navigation, for four months of the year, from its mouth to La Salle—a distance of 212 miles—where it is united to the Illinois and Michigan canal, and forms the connecting link of navigation between the Mississippi and lake Michigan.

The next steamboat river is the Ohio, which has good steamboat navigation from its mouth to Pittsburgh, a distance of one thousand miles.

This river has many important tributaries; the Tennessee, the Cumberland, Green river, Kentucky river, Kenhawa, the Alleghany, Monongahela, Beaver, Muskingum, Scioto, Miami, Wabash, and others of less notoriety, but furnishing, to some extent, good steamboat navigation.

The whole steamboat navigation of the Mississippi and its tributaries can be stated at 16,674 miles, as will be seen from the following table, furnished by Lieutenant Colonel S. H. Long, of the corps of topographical engineers.

"*Probable extent of steam navigation on the western waters, including the rivers, bayous, &c., connected with the Mississippi by channels navigable for steamers.*"

MISSISSIPPI AND ITS BRANCHES, BAYOUS, &C.

Mississippi proper	2,000 miles.
St. Croix	80 "
St. Peter's	120 "
Chippeway	70 "
Black	60 "
Wisconsin	180 "
Rock	250 "
Iowa	110 "
Cedar	60 "

Des Moines	250	miles.
Illinois	245	"
Maremec	60	"
Kaskaskia	150	"
Big Muddy	5	"
Obion	60	"
Forked Deer	195	"
Big Hatchee	75	"
St. Francis	300	"
White	500	"
Big Black	60	"
Spring	50	"
Arkansas	600	"
Canadian	60	"
Neosho	60	"
Yazoo	300	"
Tallahatchee	300	"
Yalabusha	130	"
Big Sunflower	80	"
Little Sunflower	70	"
Big Black	150	"
Bayou De Glaze	90	"
Bayou Care	140	"
Bayou Rouge	40	"
Bayou La Fourche	60	"
Bayou Placquemine	12	"
Bayou Teche	96	"
Grand river	12	"
Bayou Sorrele	12	"
Bayou Chien	5	"

MISSOURI AND BRANCHES.

Missouri proper	1,800	"
Yellow Stone	300	"
Platte River	40	"
Kansas	150	"
Osage	275	"
Grand	90	"

OHIO AND BRANCHES.

Ohio proper	1,000	"
Alleghany	200	"
Monongahela	60	"
Muskingum	70	"
Kenhawa	65	"
Big Sandy	50	"
Scioto	50	"
Kentucky	62	"
Salt river	35	"

Green	150	miles.
Barren	30	"
Wabash	400	"
Cumberland	400	"
Tennessee	720	"

RED RIVER AND ITS BRANCHES, BAYOUS, &c.

Red river proper	1,500	"
Wachita	375	"
Saline	100	"
Little Missouri	50	"
Bayou De Arboune	60	"
Bayou Bartholomew	150	"
Bayou Bœuf	150	"
Bayou Macon	175	"
Bayou Louis	30	"
Tensas river	150	"
Lake Bistenaw	60	"
Lake Caddo	75	"
Sulphur Fork	100	"
Little river	65	"
Kiamichi	40	"
Boggy	40	"
Bayou Pierre	150	"
Atchafalaya	360	"
	16,674	"

3.—"*Population depending upon the lakes as a means of communicating with a market.*"

There are seven States and one Territory immediately connected with the lakes, namely: Vermont, New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, and the Territory of Wisconsin. The total population of these States and of the Territory was, by the census of 1840, 7,369,630, which, at the general average increase throughout the United States of 3.41 per cent., would, in 1846, amount to 8,877,456.

But the whole extent of these States does not depend upon the lakes as a means of communicating with a market, and cannot, therefore, be so represented. Confining our remarks upon such portions of these States as do so depend, there are 71 riparian counties, or counties resting immediately upon the lakes, and 166 counties not riparian, but depending upon the lakes as a means of communicating with a market. The population of these 237 counties was, by the census of 1840, 2,213,251, namely: of riparian counties in the States of—

Vermont	101,790
New York	534,892

Pennsylvania (one county, Erie)	31,344
Ohio	122,174
Michigan	60,184
Indiana	11,814
Illinois	12,834
Wisconsin Territory	12,050
	887,082

Counties not riparian, but depending upon the lakes for means of communicating with a market of the same States, namely:

Vermont	75,488
New York	73,224
Pennsylvania	94,750
Ohio	600,945
Michigan	152,083
Indiana	238,449
Illinois	80,235
Wisconsin Territory	10,995
Total	1,326,169
Add riparian counties	887,082
Aggregate	2,213,251

This was the population of that region for 1840, according to the census of that year. The question now is, what ratio of increase shall be applied to bring this population up to 1846. The census of the United States is taken every ten years; we have, therefore, census periods of ten years, and the population for those periods.

The first period is from 1790 to 1800; during this period the population increased at a rate of 3.50 per cent., for each year.

Second period from 1800 to 1810; during this period the population (of 1800) increased at a rate of 3.64 per cent. for each year.

Third period from 1810 to 1820; during this period the population (of 1810) increased at a rate of 3.31 per cent. for each year.

Fourth period, from 1820 to 1830; during this period, the population (of 1820) increased at a rate of 3.35 per cent. for each year.

Fifth period, from 1830 to 1840; during this period, the population (of 1830) increased at a rate of 3.26 per cent. for each year.

These several census periods, then, give the following ratios of increase, namely:

1st	period,	from 1790 to 1800, 3.50	per cent. per year.
2d	do	1800 to 1810, 3.64	do
3d	do	1810 to 1820, 3.31	do
4th	do	1820 to 1830, 3.35	do
5th	do	1830 to 1840, 3.26	do

Or an average ratio, of each census period, of 3.41 per cent. the year.

To those who may be disposed to test these calculations, it may

be proper to remark, that these ratios are the ratios upon the accumulated population of each census period, and, except in the first case, are not upon the original population of 1790.

Taking the original population of 1790, the ratio of increase would be—

From 1790 to 1800, 3.50 per cent. per year.
1790 to 1810, 4.21 do
1790 to 1820, 4.84 do
1790 to 1830, 5.68 do
1790 to 1840, 6.68 do

Average, 4.98; but this average is applicable only to the original population of 1790.

For the lakes, I have taken the accumulated population of the last census period, (1840,) to which, in my judgment, the average ratio of the census periods can only with propriety be applied—that is, the ratio of 3.41 per cent. for each year since 1840.

The population of the lakes has, without doubt, experienced a higher ratio of increase. All the causes of increase of population—births, emigration, migration, abundant food, and a good climate—have operated with great energy for many years past in favor of the whole western country, which will, without doubt, be clearly exhibited in the census of 1850. Until then, however, reliable data for this increase will be wanting, and the ratio assumed, although it may prove to be too small for the census period from 1840 to 1850, will yet, on that account, be exempt from all reproach of a desire to exaggerate.

Emigration will, no doubt, for many years to come, feel all its present energetic impulses, yet, however, in order to avoid conjecture, we must wait until after the census of 1850 before we shall be able correctly to exhibit the effects of these impulses upon our population. There is also a reflection due to this part of the subject, which may prevent too sanguine expectations from emigration. Emigration will, probably, in time, correct itself—of necessity it will, or the governments of Europe will become exhausted of their laboring classes. The evils and oppressions, moral and political, which now urge the emigrant to leave the land of his nativity, and seek a home in a new and distant country, will have to become abated, or Europe will be deprived of its most profitable and most enterprising population. That they will become abated, in order to avoid such ruinous consequences, is but rational to suppose. All those evils consequent upon a crowded population are abated by emigration itself; and, therefore, it is but rational to suppose that many calculations upon the future population of the United States, founded upon emigration, will not be fully realized.

Good authorities will justify the opinion that the entire population of Europe increases about two millions the year; which would encourage the idea that about two millions could be annually spared from Europe as emigrants, without injury to any of her existing social relations. But emigration, on that supposition, would have to be general. It is well known not to be so, but to be

rather local—the chief body of emigrants being from Great Britain and from parts of Germany; which countries already seriously feel the effects of emigration, and are making strenuous efforts to discourage it. Yet, notwithstanding these efforts, there is every reason to believe that a strong tide of emigration will, for many years, continue to flow to the United States.

Under all circumstances, however, it is not unreasonable to suppose that emigration from Europe, now so seriously interesting to economists of that quarter of the world, will, to some extent, under ameliorated systems, experience a reduced energy. Already evils of a crowded population of parts are said to have become abated. Evils emanating from restricted civil rights are not so easily cured. These will, without doubt, turn the attention of the emigrant to this country for years to come. Yet, from all these reasons, it appears to me not irrational to suppose that many calculations of the future population of the United States, founded upon emigration, will not be fully realized; and, therefore, that the ratio of increase of the United States, deduced from all causes, as the experience of many years, is the most safe for the census period since 1840.

Applying this ratio to the population of 1840, (2,213,251,) it will give for the population depending upon the lakes. as a means of communicating with a market for the year 1846, 2,666,082.

This result, however, is obtained by using the census of 1840 as the basis of calculation, increasing it by the annual average of 3.41 per cent., to extend the population to 1846. But it is well known that, among the States of this category, are several new States and a Territory, which have experienced a very rapid increase of population, not unusual under such circumstances. This average, therefore, would not give the correct result in relation to these; and fortunately, in several cases, a State census has been taken as late as 1845, from which I am enabled to make the following corrections:

Amount as previously ascertained.....	2,666,082
Add for Michigan.....	92,011
Illinois.....	46,500
Wisconsin	124,332
Making an aggregate of.....	2,928,925

as the population depending upon the lakes for means of communicating with a market for the year 1846. Even this amount, I have no doubt, will be put in error, and be proved too small, by the census of 1850, as the lake counties have increased with singular rapidity. But I am without data for more than has been stated.

4.—"*Amount of tonnage (American) employed upon the lake trade; distinguishing, as far as practicable, between steamboats, propellers, and sailing craft, and the number of hands (understood to be hands employed in sailing, and managing as mariners, and hands on board,) employed in the trade.*"

The registered and licensed tonnage of the lakes, as previously

stated in this report, was, for 1846, 106,836 tons; divided as follows:

Steam tonnage	60,825
Sailing tonnage	46,011

The further division of this tonnage into steamboats, propellers, and sailing craft of different kinds, cannot be made out from the government records, but on the authority of Mr. Barton, of Buffalo,* I am enabled to make the following division for the upper lakes, that is, for the lakes above the Falls of Niagara:

Steamboats	62
Propellers	18
Barks and brigs	59
Schooners, sloops, and sailing scows	319

Also, from the same authority, the average tonnage of these several kinds of craft is as follows:

Steamboats	401	tons average.
Propellers	328	do
Brigs and barks	230	do
Schooners	152	do
Sloops and scows	46	do

Lake Ontario, (below the falls of Niagara.)—Upon the authority of Mr. Judson, an agent of this office at Oswego, the (American) tonnage of Lake Ontario is 26,170 tons, and divided as follows:

8 steamers, average	277	tons.
10 propellers	275	do
186 sailing vessels	114	do

The American tonnage of this lake is small in proportion to the commerce of the lake, in consequence of the great amount of British tonnage employed.

Lake Champlain.—The tonnage of this lake is 3,192 tons. I am not able to state the proportions of steam and sailing tonnage.

The remarks and facts which have now been submitted in reference to the commerce of the lakes, and of the western rivers, will justify the following general conclusions:

1st. That the net moneyed value of the commerce of the lakes, and of the western rivers, including the passenger trade, amounted, for the year 1846—

Of the lakes to	$63,164,910
Of the western rivers to	183,609,725
Aggregate	$246,774,635

2d. That the population depending upon the lakes and upon the western rivers as a means of communicating with a market, was, for the year 1846—

* See his letter of the 11th February, 1847, hereto annexed.

Of the lakes	2,928,925
Of the western rivers	6,576,027
Aggregate	9,504,952

3d. That the number of hands employed in this commerce, as mariners, exclusive of shore hands, for the year 1846—

For the lakes	6,972
For the western waters	25,114
Aggregate	32,086

And it may be added, from the authority of Senate document No. 44, 2d session, 29th Congress, that the total amounts which have been appropriated and expended for lake harbors, and for the improvement of the western rivers, from the year 1806, when these appropriations by the general government commenced, up to and including the last appropriations of 1845, is

For the lake harbors	$2,790,500
For the western rivers	2,758,800
Aggregate	$5,549,300

5.—"*Facilities of communication, by railroads and canals, (through the medium of the lakes,) with the Mississippi and the Atlantic.*"

All these facilities are under the authority of the several States. This office is not, therefore, the depository of the records of them, other than such as have been from time to time received as acts of courtesy, or such as have been collected since the date of the resolution of the Senate.

Several canals and railroads have been made, others are in progress, and others in prospect or plan. I shall limit myself to a brief description of the two first, as accurately as enabled to do from information in this office.

These facilities naturally divide themselves into two classes. First, those which connect the lakes with the valley of the Mississippi; Second, those which connect the lakes with the Atlantic.

Of the first class—

1*st. The Illinois and Michigan canal.*—This canal is 96½ miles long, 60 feet wide at the water surface, and six feet deep. Its locks, in number 17, are 110 feet long, by 18 feet wide, and the total amount of lockage 158 feet. It connects with the Chicago, which empties into Lake Michigan, within five miles of the lake, up to which point and above, 10 feet of water can be carried from the lake. The other extremity of the canal is connected with the Illinois river at the town of La Salle, from whence that river has to be used to the Mississippi, through a distance of about 213 miles. Throughout the whole of this distance the Illinois is navigable for

flat boats the year round, except during the ice season of winter, and with steamboats for about four months of each year, and partially with steamboats for about eight months.

There is a navigable feeder to this canal, 17 miles long, which enters the canal 20 miles west of Chicago. This feeder extends to the Kalymick river, at a point within 20 miles of the Indiana State line, and opens to the canal the trade of the Kalymick. The Kalymick empties into Lake Michigan, about 13 miles south of Chicago, and the point on the river at which the feeder is connected with it, is about 6 miles from the junction of the river with the lake. By these means a second communication is formed between the canal and the lake. The entrance of the Kalymick from the lake, is yet uni nproved, but it is capable of being made an entrance for first class steamers. After entering the river, not less than ten feet of water can be carried up to (and above) the point of junction with the feeder. There is, also, a second navigable feeder, 50 miles west of Chicago, five miles long, and connecting with the Kankakee river, by means of which great facilities are furnished to the trade of a large portion of Indiana, through which the Kankakee passes. These feeders are forty feet wide and four feet deep. The canal and its feeders are now in active progress of construction. It is confidently stated that the whole will be completed by January ensuing, and open for use next spring.

2*d. Wabash and Erie canal.*—The Wabash river empties into the Ohio, about 130 miles above the junction of the latter with the Mississippi. The canal takes its origin at Lafayette, about 378 miles up the Wabash. It is 187 miles long, and is connected with the Maumee river at Toledo, immediately adjacent to Lake Erie. The distance from Lafayette to Toledo is completed and in use, and the plan now in contemplation is to extend the canal from Lafayette to the Ohio. About 75 miles westward from Toledo, upon the canal, at a place called Junction, a connexion is formed with the Miami canal from Cincinnati. This canal is 180 miles long, 40 feet wide at water surface, and 4 feet deep, and the locks, 85 in number, are 90 feet long by 15 feet wide. I am not able to state the dimensions of the Miami canal, but of course they are not less than those of the Cincinnati branch.

I have stated that it was in contemplation to extend the canal from Lafayette, down the valley of the Wabash, to the Ohio. Already 88 miles of this extension, to the town of Terre Haute, is in progress, where a connexion will be established between the canal and the river, and from which point, to the Ohio the river, will be used, until the whole extension to the Ohio be completed. The Wabash and Erie canal has, therefore, two connexions with the valley of the Mississippi by the medium of the Ohio; one by the way of the Wabash river, from Terre Haute to its mouth, and the other by way of the Cincinnati Branch canal, usually called the Miami canal.

The navigation of the Wabash river from Terre Haute down to the Ohio is good for flat boats during nine months, and for steamboats during about four months.

The length of the Muskingum improvement is 91 miles, including the extent above Zanesville, to accommodate which there is a lock 120 feet long and 22 feet wide. (But that part of the improvement, which constitutes the improvement between the Ohio and Lake Erie, is —— miles long, in which there are 11 locks 175 feet long by 36 feet wide.) The distance from the Ohio to Lake Erie, by this route, is 238 miles.

3*d*. *Sandy and Beaver canal*.—This canal leaves the Ohio and Erie canal at Bolivar, 229 miles from Portsmouth and 80 miles from Cleveland, uniting with the Ohio 76 miles from Bolivar, at the mouth of Little Beaver, thence to Beaver, where it unites with the Beaver division of the Pennsylvania canal.

The distance from the Ohio to the lake, by this route, is 156 miles.

4*th*. *Mahoning canal*.—This is rather a cross-cut canal, uniting the Ohio and Erie canal at Akron with the canal from the Big Beaver to Erie above New Castle. It is 83 miles long, and furnishes the means of a second connexion with Lake Erie (from the Ohio and Erie canal) at Erie.

From the foregoing, it will appear that there are the following points of connexion by canal between the valley of the Mississippi and the lakes, namely—at Chicago and the mouth of the Kalymick on Lake Michigan; but, from the unimproved condition of the mouth of the Kalymick, this last is at present of no value; at Toledo and Cleveland, on Lake Erie, and by the Mahoning canal, with the harbor of Erie. To these may be added the further connexion with Lake Ontario, by the Welland (Canada) canal, and with Lakes Ontario and Champlain by means of the New York canals; and that the points of union of these canal routes with the valley of the Mississippi are the following: Mouth of the Illinois river, on the Mississippi, 40 miles above St. Louis; mouth of the Wabash, on the Ohio, 130 miles from the Mississippi river; Cincinnati, on the Ohio, 550 miles from the Mississippi river; Portsmouth, on the Ohio, 589 miles from the Mississippi river; mouth of the Hocking, on the Ohio, 756 miles from the Mississippi river; at Marietta, on the Ohio, 783 miles from the Mississippi river; mouth of Little Beaver, on the Ohio, 924 miles from the Mississippi river.

There is also a canal now in use called the Beaver and Erie canal. It connects with the Ohio 28 miles below Pittsburg. The canal is 136 miles long, 40 feet wide, 4 feet deep, with locks 90 feet by 15, and a lockage of 929½ feet. This canal connects with the lake at the harbor of Erie.

In addition to these facilities by canal, several railroads have been projected, some of which have been partially completed. The Michigan railroad from St. Joseph, on Lake Michigan, to Detroit—this road is 200 miles long, 156 miles of which are now in use; the Mad river and Lake Erie railroad, from Sandusky, on Lake Erie, to Dayton—this road will be —— miles long, 91 miles are now in use, and 119 miles to Urbana are expected to be in use by next spring. The connexion of this road with the Little Miami

road, at Springfield, will make a continuous railroad connexion from Sandusky, on Lake Erie, to Cincinnati, on the Ohio. The Mansfield and Sandusky railroad—this road is to extend to Columbus, where it will be connected with the Ohio and Erie canal; the road as far as Mansfield, 59 miles, is completed.

Second class, or connexions by means of canals and railroads between the lakes and the Atlantic.

1*st. The great canal from Buffalo, on Lake Erie, to Albany, on the Hudson river.*—This canal is 363 miles long, 40 feet wide at water surface, 28 feet wide at bottom, and four feet deep. It has 84 locks, 90 feet by 15, and a total lockage of 688 feet. The Erie enlargement modifies these dimensions of the canal to a width of 70 feet, and a depth of 7, and the locks to be 110 feet long by 18 feet wide. Aqueducts to be enlarged proportionally. This enlargement has already been extended over about 113 miles of canal length, 98 enlarged locks have been made, and 22 aqueducts with other works, such as culverts, bridges, waste wiers, &c. This is undoubtedly the existing line of water communication between the lakes and the Atlantic. There are several branches of this canal, of great importance, extending its lake connexions. The branch from Syracuse to Oswego, on Lake Ontario. Syracuse is 170 miles west of Albany, and the length of this branch is 38 miles. The Black River canal from Rome, 125 miles west of Albany, to Carthage, on Black river, 30 miles above its entrance into Lake Ontario, at Sackett's Harbor. The canal and river navigation of this branch is 76 miles. The Champlain canal from the Erie canal, 9 miles north of Albany, the head of Lake Champlain, at White Hall. This branch is 65 miles long. The Erie canal then connects with Lake Erie, at Buffalo; with Lake Ontario, at Oswego, and at Sackett's Harbor; with Lake Champlain, at Whitehall, and with the Hudson, at Albany; by which an unbroken water communication is established between those lakes and the Atlantic.

There are, however, other connexions between this canal and the Atlantic, which should be noticed. The Chenango canal from Utica, 110 miles west of Albany to the Susquehannah, at Binghampton, thence by the Susquehannah to the Pennsylvania canals. The Genesee Valley canal from Rochester, 270 miles west of Albany, to Olean point, at the head of boat navigation, on the Alleghany. It is 120 miles long, and has 114 locks.

By canal and railroad.—From the Erie canal, at Montezuma, 205 miles west of Albany, to Philadelphia, and thence to Baltimore by railroad, or by canal and river navigation, namely:

Seneca canal	23	miles
Seneca lake	40	do.
Chemung canal	23	do.
Williamsport and Elmira railroad	73	do.
Susquehannah canal, and West Branch canal	94	do.
Harrisburg and Lancaster, and Columbia railroads	107	do.
Total to Philadelphia	360	do.

From the Erie canal, at Montezuma, to Cayuga lake, thence the Ithaca and Oswego railroad to the Susquehannah, at Oswego; thence by the river to Tioga point, where it intersects the canal at Philadelphia; and thence by railroad or water, or both, to Baltimore.

There is also a continuous railroad from Buffalo to Albany, and from Albany to Boston.

2d. *Canal and railroad from Philadelphia to Pittsburg.*—As this route connects the Atlantic with the Ohio—and the latter has its connexions with both the lakes and the Mississippi river—it becomes a route within the scope of the resolution of the Senate. The route is made up of the following parts:

The Columbia railroad from Philadelphia to Harrisburg, on the Susquehannah	82	miles.
Centre division of the Pennsylvania canal from Columbia to Holidaysburg	172	do.
Portage railroad from Holidaysburg to Johnstown	36	do.
Western division of the Pennsylvania canal from Johnstown to Pittsburg	104	do.
Total	394	do.

The Columbia railroad, 82 miles long, has its summit at "Mine ridge gap," about 55 miles from Philadelphia, where it attains an elevation of 335 feet above tide. The maximum grade, exclusive of the inclined plane, with a stationary engine at the Schuylkill river, is 45 feet in the mile. The centre division of the Pennsylvania canal, 172 miles long, is 40 feet wide at top, 28 feet wide at bottom, and 4 feet deep. It rises 670 feet between Columbia and Holidaysburg. In this distance, there are 18 dams, 108 lift locks, and 16 miles of slack-water navigation. The locks on the lower part of the canal, below Duncan's island, are 90 feet long, by 17 feet wide; those above, between Duncan's island and Holidaysburg, are 90 feet long, and 15 feet wide.

The Alleghany Portage railroad is 36 miles long. It ascends 1,398 feet in 10 miles, and falls 1,172 feet in about 26 miles. The western division of the Pennsylvania canal is 104 miles long, 40 feet wide at top, 28 feet wide at bottom, and four feet deep. It has 66 locks, each 90 feet long, by 15 feet wide.

These constitute all the canals and railroads made, and being made, which fall within the scope of the 5th inquiry of the resolution of the Senate. Probably some have been omitted, but, if so, it is owing to the inattention of those to whom I have applied for information.

Canals and railroads being State works, this office does not possess authentic records of them. No pains have been spared in making inquiries, but replies have not always been furnished, nor always satisfactory when furnished. It is difficult to impress correspondents with the notions that exact dimensions of parts, and descriptions of points of connexion, are more desirable than pages of general remark.

6.—"*Adaptation of the commercial means of the lakes to purposes of defence, and of military operations generally.*"

These, rigidly speaking, may be considered as limited to those facilities which can be furnished by the commercial marine of the lakes—such, for instance, as means of transporting troops and supplies of all kinds—means of forming an auxiliary military marine—means of furnishing sailors and mariners.

The total commercial tonnage of the lakes has been stated at 106,836 tons; of which the tonnage on the upper lakes, or the lakes above the falls of Niagara, is 80,245. Mr. Barton, of Buffalo, reports the tonnage on these lakes to be 91,243. He probably includes the unlicensed tonnage of small boats in his estimate. Be that as it may, I consider it the safer rule, in the discussion of a question of this kind, to adopt the tonnage as reported by the Treasury Department.

In a state of emergency—such as war with our neighbors of Canada—the greater part of this tonnage could, without doubt, be commanded by the government; and, as under such circumstances, the commerce of the lakes would experience a serious reduction, it is not unreasonable to suppose that 30,000 tons of the upper lake shipping could be fairly counted upon as disposable for government purposes, in the transportation of troops and supplies, and in the formation of an auxiliary military marine. Trips upon the lakes are short; water has not to be carried; therefore the whole of the tonnage used by government can be applied to its maximum utility. Now, if it be supposed that this tonnage (30,000) is adequate to the transportation of 10,000 men, and all their supplies, to any point on the upper lakes; that a voyage to any point can be made in ten days, and be repeated ten times in a season, we have a disposable tonnage adequate to the transportation, in one season, of 100,000 men, and all their supplies, to and from any point on the upper lakes.

This supposition, however, takes for granted that we have the command of these lakes, and of the straits of Detroit and St. Clair.

It is stated that there are 62 steamers on the upper lakes, (not including propellers,) which average about 400 tons each. Many of these are large boats, strongly built, well found, and furnished with able seamen as captains, and with excellent pilots. It may, I think, be safely stated, that at least ten of these boats are of 600 tons and upwards. Some estimates make the number of large steamers greater; and it is well known that the commercial wants and habits of the lakes, and experience in their navigation, are rapidly substituting the larger and stronger for the smaller boats.

Ten boats of the size stated can be made to carry 10 heavy guns each, with all requisite supplies. The commercial marine of the upper lakes, therefore, already furnishes means of equipping, at short notice, not less than 10 steamers, which can bear an armament of 10 heavy guns each; and as there is not any of the steamers which could not be made to carry from one to four heavy guns

each, there are also means, on any great emergency, of adding to the fleet from 40 to 50 armed steamers of smaller than 10 gun batteries. I allude to the commercial marine, as above indicated, as a mere auxiliary fleet, in addition to the national military fleet which may have to be established upon the lakes.

We have stated the whole number of lake mariners at 6,972; which will give for the proportional tonnage of the upper lakes, 5,212; and for the tonnage which we have supposed would be conveniently disposable for government purposes, about 1,500. But, in cases of emergency, nearly the whole of these mariners could be obtained.

The present commercial marine of the upper lakes is, therefore, adequate to supply, without injury to the commerce of a state of war, as an auxiliary to a national fleet, means of transporting 10,000 men and all their supplies—means of creating, at short notice, ten heavily armed steamers, and of furnishing 1,500 mariners. As before remarked, however, in cases of emergency, the whole commercial marine of the upper lakes could be made tributary to their defence, and would produce an extremely formidable power.

The British tonnage on these upper lakes is extremely small, in comparison to the American. Their steamboat and propeller tonnage is less than 2,500; and their total tonnage of all kinds does not, from the best accounts, exceed 4,500. So great an inequality gives to the American tonnage a vast advantage; and, reasoning from this disparity, will justify the inference, that on the upper lakes, in all the military facilities derivable from commercial tonnage, our preponderence is so decided that we may consider ourselves as possessing the military command, without rivalship or fear of losing it.

The lower lakes—that is, lakes below the falls of Niagara.

Lake Ontario.—The tonnage of this lake is 23,399 tons, excluding the Oswegatchie district as rather that of a river (St. Lawrence) tonnage. It is divided as follows, according to the report of Mr. Judson:

8 steamers,	of 277 tons	average	each.
10 propellers,	of 275	do	do.
*186 sailing vessels,	of 114	do	do.

Of these steamers, three are upwards of 400 tons, and one of upwards of 300 tons. There are also two propellers of upwards of 400 tons, and two above 300 tons each.

As the greater part of the trade of this lake passes through the ports of Canada, a war with that power would leave nearly the whole of the tonnage of that lake unemployed, and disposable for government purposes. I think it would be safe under such circumstances to say that 15,000 of the tonnage of this lake would be so

* Note.—These average rates would give 26,170 tons—the error is probably in the over estimate of the sailing craft and its tonnage; or probably the Oswegatchie district was included by Mr. Judson in his statement.

disposable. A tonnage adequate to the transportation of 5,000 men and their supplies, as the most distant voyages on this lake by steam, do not occupy more than two days. The four large steamers could be adopted as an auxiliary armed fleet, and could be made to carry ten heavy guns each. The Oswegatchie district would in a state of war have no use for its tonnage and seamen. The whole of these may therefore with propriety be considered as part of the military means of Lake Ontario. This would add to what has been enumerated 2,058 tons of shipping and about 300 mariners.

The total number of mariners employed on Lake Ontario is about 1,560, which, for the tonnage of this lake, that has been supposed could be readily controlled in time of war, would give 1,000. To this number, add the disposable mariners from the Oswegatchie district, and we have 1,300.

The commercial means of this lake could, therefore, furnish for its defence 15,000 tons of shipping, four heavily armed steamers, and 1,300 men.

But, as will appear in subsequent pages of this report, the British preponderance in commercial tonnage on this lake gives to them great advantages.

Lake Champlain.—The tonnage of this lake is stated at 3,192. It may be considered as exclusively an American lake, with the door to its entrance in our possession. Its commerce would experience but little interruption from a state of war, and its tonnage would furnish great facilities for military operations and for the defence of its waters.

But the lake commerce, on matters of defence, admits of a more general aspect. I allude now to its being so great a nursery of seamen; under which consideration, sound reasoning also requires us to place the trade of the western rivers. Men accustomed to the navigation of these rivers, or to that of the lakes, acquire a fondness for the seafaring life, and readily become expert seamen. These two sources now employ annually about 32,086 hands, as mariners of all kinds. A state of war with a commercial power would of necessity throw many of them out of their accustomed employments, and their habits would naturally induce them to seek the kindred employment of the ocean. If it be supposed that this necessity should not extend over more than one-third of their number, it would now furnish upwards of 10,000 young and active able-bodied men, accustomed to the water, for a military marine, either for service on the lakes or on the broad Atlantic. We think it may therefore be said without fear of error, that the lake and the western river commerce is at this moment the greatest nursery of seamen possessed by any nation—a nursery as yet but partially developed, occupying a most luxuriant soil, and daily increasing beyond all known precedents.

Supposing this nursery to increase in a no greater ratio than our general population, it will, in ten years from 1846, produce 43,027. But reasonable calculations on the sound data of experience, would bring that number in that time to about 50,000; that is, the inland

nursery, the nursery of the western rivers and the lakes, not including that of the sea coast and of sea service.

7.—"*Extent of lake coast, and of the same in the different States and Territories; harbors in this extent, their condition and usefulness; and a comparison of their present condition with that before improvements were made.*"

The great lakes of our country, which may justly be considered inland seas, and to which the inland commerce described in this report relates, are the following: Champlain, Ontario, Erie, St. Clair, Huron, Michigan, Superior. These lakes are of great depth, as well as of great extent. The entire line of lake coast embraces about 5,000 miles, 2,000 miles of which constitute the coast of a foreign power.

Lake Champlain is	105 miles long.
Its greatest width	12 miles.
Its average width	8 miles.
Lake Ontario is	180 miles long.
Its greatest width	52 miles.
Its average width	40 miles.
Lake Erie is	240 miles long.
Its greatest width	57 miles.
Its average width	38 miles.
Lake St. Clair is	18 miles long.
Its greatest width	25 miles.
Its average width	12 miles.
Lake Huron is	270 miles long.
Its greatest width (not including the extensive bay of Georgian, itself 120 miles long, and averaging 45 wide) is	105 miles.
Its average width	70 miles.
Lake Michigan is	340 miles long.
Its greatest width	83 miles.
Its average width	58 miles.
Lake Superior is	420 miles long.
Its greatest width	135 miles.
Its average width	100 miles.

These lakes may be considered as connected throughout their whole extent. Lake Champlain connects with Lake Ontario by means of the river Richelieu; the lock and dam navigation of St. Lawrence river; the Ottawa river; the Rideau canal through Canada; and the Champlain and Erie canals of New York. Lake Ontario is connected with Lake Erie by means of the Welland canal through Canada, and by means of the Oswego and Erie canals through the State of New York. Lake Erie is connected with Lake St. Clair by the deep and navigable strait of Detroit, 25 miles long. Lake St. Clair is connected with Lake Huron by the deep and navigable strait of St. Clair, 32 miles long. Lake Huron is connected with Lake Michigan by the deep and wide strait of Mackinaw, and with Lake Superior by the strait of St. Mary's, 46 miles long.

This strait is navigable throughout except for about one mile of its length, immediately adjacent to Lake Superior, where, from rocks and the extreme rapidity of the current, navigation ceases. These difficulties can, however, be easily surmounted by a canal of not more than a mile long, with locks to overcome a fall of about 21 feet. The only additional obstruction to this immense extent of inland navigation is in St. Clair lake, on approaching the St. Clair strait. This obstruction consists of an extensive bar, but not of great width, over which not more than seven feet water, in depressed conditions of the lakes, can be counted upon. From an examination of this shoal, it has been found to consist of an indurated marl, leaving but little cause of doubt that if a channel were once dredged through, it would remain a durable improvement.

Lake Champlain lies exclusively (except the strait near Rouse's point) within the States of Vermont and New York; the former occupying its eastern, the latter its western margin. It is not considered a dangerous lake to navigate; and the principal protection which its commerce requires, is in the form of breakwaters, to shelter its open harbors.

The Vermont coast of this lake embraces about 100 miles. The only harbor in this extent, at which the general government has operated, is the harbor of Burlington. Burlington is situated on the margin of the lake, or rather upon the margin of a bay of the lake; and its landings and wharves were much exposed to the waves of the lake, rendering access to the wharves difficult, and often dangerous. The improvement consists in the construction of a breakwater, now nearly completed, and which, in its unfinished state, has rendered great and valuable services.

The government has also operated on this side of the lake with the dredge-boat, upon a passage between the two Heroe islands, with important and permanently useful effects. The additional depth obtained there remains, to this day, as good as when first made, although the work was done in 1837. It requires, however, to be further enlarged, to produce all the valuable consequences anticipated from the plan.

The New York coast of this lake is also about 100 miles long. The harbor on this side, at which the government has been at work, is Plattsburg. The work, the object of it, and its useful consequences, are similar to those at Burlington, on the opposite side of the lake; and, like the work at Burlington, it is unfinished.

At the town of Whitehall, the southern extremity of the lake, and where the Champlain canal communicates with the lake, the harbor is liable to a filling up, which has occasionally to be removed. It was cleared out by the dredge-boat about ten years since, but now again requires the same aid.

The import and export trade of the Burlington district, for the year 1846, is stated at	$3,777,726
Of the Plattsburg district, same year.....	1,160,844
Whitehall district, same year.....	6,327,489
Making a total for this lake of.....	11,266,059

And the total amount appropriated for harbor improvements on this lake is $191,500.

LAKE ONTARIO.

Nearly the whole of the southern shore of this lake is within the limits of the State of New York, giving to that State, upon this lake, about 200 miles of coast. The harbors upon this coast are—

1st. *Sackett's harbor, near the eastern extremity of the lake.*—This is a fine natural harbor, and was used as the great naval depot during the war of 1812. It is liable to serious objections for such a purpose, from its proximity to Canada and the fortified post of Kingston, and its consequent liability to surprise and destruction. The principal expenditures at this harbor have been for the improvement of the entrance of Black river, which empties into Sackett's harbor. But, as it was considered rather a local than general matter, no appropriations have been made in its favor since 1834.

Proceeding along the coast from Sackett's harbor westwardly, there are many inlets and small streams, which to some extent are harbors. But, presuming that the resolution of the Senate desired a reference only to harbors of notoriety, and of general importance, I shall confine the remarks of this report to such as can, with propriety, be considered of that character.

2d. *Port Ontario, or mouth of Salmon river.*—This river empties into the lake about 30 miles from Sackett's harbor. The lake here forms an indentation, usually called Mexico bay. The navigation of this bay is extremely dangerous. Vessels caught there with an adverse wind rarely escape shipwreck; and the port of Salmon river affords the only place of refuge within the bay. The entrance to this river was obstructed by a sand bar, over which, during the most favorable periods, not more than about 6 feet of water could be found. The works for the improvement of this entrance were commenced in 1836, but were never finished, or extended into the lake, in conformity with surveys and plans. The entrance has, however, been much improved, as there is now, at all times, a depth of 8 feet over the bar. But this depth is inadequate to the wants of the lake trade, about 12 feet being required to insure a safe and easy entrance for first class lake steamers, and during rough weather. It is believed that this depth could be obtained by extending and completing the works in conformity with submitted and approved plans.

3d. *Oswego, twenty miles westwardly from Salmon river.*—The difficulty at this place was not in the want of depth at its entrance, but in the want of protection from winds, and from the wave of the lake. It is formed by Oswego river, which opened into the lake by means of a small bay. This bay is, properly speaking, the harbor; and the plan of improvement has been by extending crib-work piers from each cape of the bay to cover the entrance, and to shelter the bay from wind and wave. The work was commenced in 1827, and has been continued up to this time—the last

appropriation being in 1844. The protection of the harbor has been great and satisfactory; and the efforts of late years have been to substitute more durable for the perishable material first used. But these efforts have progressed very slowly, because of the smallness of appropriations, and their frequent interruption—so slowly as not to keep pace with the dilapidations of time and storms; and there is now great danger that the whole of the eastern pier will be destroyed, and that the advantages and economy anticipated from its use, as a foundation for the more permanent superstructure, will be lost. The storms of this year have already swept away much of this pier. The Oswego canal connects this place with the Erie canal at Syracuse, and thence with Buffalo on lake Erie, and also from Syracuse with the city of New York.

4th. The next harbor (proceeding westwardly) is *Little Sodus bay*.—By the coast line, it is about 15 miles from Oswego. This is a fine harbor of deep water, and of adequate capacity, but obstructed at its entrance by a bar having but two feet water over it. It has been surveyed, and a plan and estimate submitted for its improvement, but nothing more has been done.

5th. *Big Sodus bay* is 15 miles further to the west.—This is a remarkably fine harbor, of great capacity and depth; obstructed at its entrance by a bar affording not more than 8 feet water. The first appropriation in favor of this place was made in 1809, upon plans adapted to produce an entrance of 12 feet water. The object may be said to have been accomplished, but the passage has seriously deteriorated from the unfinished condition of the works, and from the injuries to which they were liable, from the perishable character of all wood work, in such positions, near to and above the water line.

6th. *Harbor of Genesee, mouth of Genesee river*—This harbor is 32 miles westward of Big Sodus. Few places show more decidedly the advantages of the works constructed for their improvement. The first appropriation in favor of this harbor was in 1829. At the time the entrance was very variable in its direction, occasionally very shallow; the channel winding, shifting, and dangerous; but since the works were erected, the passage is safe, wide, and straight, affording throughout a depth of about 15 feet. But the works are in an extremely dilapidated condition. It has been with great difficulty that their destruction has been prevented. Entire parts of the piers have been torn away by storms, and the whole superstructure is generally in a state of decay. The superstructure was of timber, as in all these works in the first instance—the plan being, as the cribs settled and the superstructure decayed, gradually to supply a superstructure of stone. But appropriations have not been adequate to carry out the plan, or to keep the works in repair; in consequence of which, their condition is rather deplorable, and there is serious danger that their advantages will be lost.

7th. *Oak Orchard creek*.—This place is 35 miles west of Genesee. The first appropriation in its favor was in 1836; but the works were never extended in accordance to the plan, and advantages

from them have, in consequence, been rather limited. The depth inside the bar arrives suddenly at 15 to 16 feet, which it maintains for about one mile up the river. Upon the bar, however, there was not more than two feet, reaching at times to four. The only beneficial effects experienced from the present unfinished piers, is the preservation of the greater depth of the entrance, and an occasional depth of six feet; but doubt is not entertained of a greater depth of entrance being obtained by the further extension of the piers, in conformity with the plan.

8th. *Eighteen Mile creek.*—This harbor is 26 miles westwardly from Oak Orchard. Nothing has been done at this place but to make the survey, plan, and estimate.

9th. The harbor of *Niagara river* is 18 miles further to the westward, and at the end of the lake. This is a good harbor.

It will be seen from the foregoing, that in this extent of 200 miles of lake coast there are but nine harbors of notoriety and adapted or adaptable to furnish refuge and shelter to the general commerce of the lakes, namely, Sackett's harbor, Port Ontario, Oswego, Little Sodus, Big Sodus, Genesee, Oak Orchard, Eighteen-mile creek, Niagara. Two of these are natural harbors, requiring but little aid, namely, Sackett's harbor and Niagara. Six are harbors upon which government has been operating, namely, Sackett's harbor, Port Ontario, Oswego, Big Sodus, Genesee, and Oak Orchard; and two have yet received no other attention than that of survey, plan, and estimate. One of these, Little Sodus, could, I have no doubt, be made an entrance adequate to accommodate first class steamers; and with more expense, the other, Eighteen-mile creek, could easily be brought in the same category.

The whole of this coast, being a southern coast, is exposed to all the violence of the prevailing northern winds of that lake, and, in consequence, eminently requires whatever protection it can obtain. There is no beating off such a coast in a gale; there is no space to run before the wind, and vessels caught there under adverse circumstances must either make harbor or go ashore; they have no other alternative.

The export and import trade of this lake for the year 1846 is stated at $14,023,907; and the total amount expended for the improvement of its harbors $608,902 87.

LAKE ERIE.

The American coast of this lake embraces 330 miles, 70 of which are within the jurisdiction of the State of New York, embracing five harbors, namely, Black Rock, Buffalo, Cattaraugus, Dunkirk, and Portland.

Black Rock is a secure harbor, and is often resorted to as a port of refuge by vessels which cannot enter Buffalo.

Buffalo is the great mart of the lake. Its commerce for 1846 is represented at about $49,000,000. The harbor consists of the channel of Buffalo creek. The entrance, once extremely shoal, is now adequate for first class steamers, but is difficult of access in south-

west gales, and the commerce of the place has been, in consequence, frequently exposed to most calamitous disasters. The present harbor is also inadequate to the accommodation of its immense commerce, and, in consequence, and by order of government, the vicinity has been carefully surveyed, and plans and estimates for the enlargement of the harbor have been made, but no decision or appropriation has been had in reference to them.

Cattaraugus.—About 25 miles west of Buffalo, Cattaraugus creek empties into lake Erie. It is the nearest place westward of Buffalo at which a harbor can be made, and constitutes an important port of refuge, as, during the violent westerly gales of this lake, if Cattaraugus be passed, vessels have no other resource than to hold on at their anchors, which is rarely possible under such circumstances, or to go ashore, and the latter is too generally their fate.

The entrance to this harbor in its natural condition was extremely shoal, with a shifting and dangerous sand bar, often impracticable for the smallest lake craft. Works for its improvement were commenced in 1836, and were continued to 1838; by which time $57,410 had been appropriated for this harbor. Very beneficial effects resulted from these works; the entrance was made safe and deep, adequate to accommodate first class steamers. But the works were never completed, and have so suffered from their unfinished condition, the effects of storms, and want of means to make repairs as required, that there is now serious cause to apprehend the entrance will relapse into its former condition, and that all the benefits of the expenditures which have been made will, in consequence, be lost.

Dunkirk, (fifteen miles west of Cattaraugus.)—This harbor is an open roadstead or small bay, admirably situated for a harbor of refuge, and very accessible during the dangerous storms of the lake; but, being exposed to all winds, except from the southward, it constitutes no place of security in its present condition. It is partially protected by an extensive rocky shoal, upon which, at one time, a crib-work breakwater was erected. While this was up, the harbor was an admirable port of refuge; but the work was never finished, and, as means were not furnished for its repair, it has yielded to time and to the violence of the lake storms, so that now scarcely a vestige of it remains. The works at this place were commenced in 1827; $92,743 have been appropriated in their favor. The pier from the western cape of the bay still remains in tolerable order, except at its farther extremity, upon which a light-house is erected. Our present operations are limited to the preservation of the communication with the light-house, and to the preservation of the foundation upon which the light-house stands.

Portland harbor, (about twelve miles west of Dunkirk.)—This harbor is similar to that of Dunkirk, but smaller and much inferior. On these accounts, chiefly, it has long since ceased to receive the aid of the general government; and with a proper improvement of the more important positions of Dunkirk and Cattaraugus, that of Portland can, without injury to the protection which the commerce of the lake requires, be postponed, or be left to local enterprise.

The Pennsylvania coast of lake Erie extends over 45 miles, embracing only the county of Erie. But this extent includes one of the best harbors on the lake, namely, Presque Isle or Erie harbor. It is a harbor of great capacity—about six square miles—with an average depth of 20 feet, easy to enter, and a very secure place when entered. There is a bar after entering, over which not more than 10 feet of water can be carried, which yet requires some work with the dredge. The first appropriation in favor of this harbor was in 1824; at which time the obstructions at its entrance did not admit of more than 6½ feet, now first class lake steamers can enter.

The only artificial entrance is at the eastern end of the harbor. At the western end, there is a natural passage, affording about 6 feet of water. The plans contemplate the making of the western entrance as deep and as easy as the eastern; but as yet no work has been done there.

The works at this harbor were commenced by the United States in 1824, have stood remarkably well, yet have experienced those injuries which time and exposure will occasion. Much work is yet required to complete the repairs at the eastern entrance and to extend one of the piers; and all of the plan at the western end, having reference to the entrance there, has yet to be attended to. The Pennsylvania canal connects with this harbor, and the amount of exports and imports, for 1846, are stated at $6,273,246.

Its great facilities occasioned it to be adopted as a principal naval station on that lake during the war of 1812, and it is now, I believe, the principal place of outfit for vessels of that character, and for winter quarters.

The Ohio coast of Lake Erie embraces 180 miles, including the following harbors, at all of which improvements have been made by the general government: 1. Conneaut; 2. Ashtabula; 3. Grand River; 4. Cleveland; 5. Black River; 6. Vermillion; 7. Huron; 8. Cunningham creek; 9. Sandusky bay.

Conneaut harbor is 30 miles west of Erie, and is the only place in that distance on the lake shore, at which a harbor can be made. It is near the boundary line between Pennsylvania and Ohio, and is, therefore, a harbor in which both these States are interested. Prior to the construction of any works at this place, the entrance was obstructed by a bar, frequently dry, scarce ever with more than two feet of water over it, but, since the construction of the piers for its improvement, which were commenced in 1829, a depth of from 10 to 11 feet can be carried from the lake into the river, and, after entering the river, it is sufficiently deep for about half a mile. The total amount appropriated for this harbor, from 1829 to 1844, inclusive, is $48,305. The works, however, are much in need of repairs, and require to be enlarged. Its commerce for 1846 is stated at $380,475.

Ashtabula is 12 miles west of Conneaut, and has a depth in its river adequate for first class steamers, for about one mile and a half from the piers. Not more than 3 feet of water could be commanded at the entrance of this harbor before the government works for

its improvement were commenced, but, since these works were put up, and now, in their present unfinished condition, a channel of nine feet deep has been obtained. This channel continues, and no doubt is entertained that, with a proper extension of the piers, and additional dredging, a depth of 11 feet, adequate for first class steamers, will be had.

The expenditures for the improvement of its entrance have amounted to $69,149, and its commerce for 1846 is stated at $715,467.

Cunningham creek is 12 miles west of Ashtabula. This place has long since ceased to be included in the government estimates. The board of inspecting officers, in 1839, having reported it as not, in their judgment, possessing a sufficiently general importance.

Grand river harbor, or Fairport.—Its situation is about 30 miles westward of Ashtabula, and about 17 westward of Cunningham creek. This is a fine harbor, with good water for two miles from its mouth. Its entrance was originally obstructed by a variable bar, at times nearly dry, and never with more than 6 feet of water over it; but since the erection of works for its improvement, 11 feet of water has been obtained and secured. The port is highly esteemed by the lake navigators as a place of refuge. It is situated about midway of the lake coast, and its entrance is so easy that vessels frequently pass other ports in severe gales, and seek shelter at this.

The present piers require repairs and extension. $65,598 have been expended on the work at this place, and the commerce for 1846 is reported at $891,584.

Cleveland.—The port of Cleveland is in Cleveland bay, and is about 30 miles westward of Fairport.

In its original state, the mouth of the Cuyahoga river, which forms this harbor, was obstructed by a variable bar, occasionally nearly dry, and rarely with as much as 6 feet of water over it. Since the works for its improvement were erected, an entrance 10 feet deep has always been commanded. The western pier requires a further extension into the lake, so as to form a species of breakwater, and thereby to protect the entrance between the piers from the violence of the sea in heavy blows. The superstructure of the eastern pier has been rebuilt of masonry, and is now a durable work. Such a course is in contemplation for the western pier, but not until the necessary extension has been completed and the pier has acquired a firm position by settling.

The importance of Cleveland is well known. The Ohio canal has its outlet there; and the commerce of this harbor for 1846 is stated at $12,559,110, and the total amount hitherto expended for the improvement of the entrance is $149,413.

Black river, (twenty-seven miles west of Cleveland.)—This river is navigable for about four miles above its entrance. Its entrance was originally obstructed by a bar, at times dry, and at times with about 3 feet of water over it. The effect of the piers constructed for its improvement has been to create and insure a depth of not less than 9 feet. The piers require a thorough repair and further ex-

tension into the lake. Its commerce in 1846 amounted to $215,040, and the amount expended upon the work at this place is $63,204.

Vermillion harbor, seven miles west of Black river, constituting the entrance of Vermillion river.—The entrance of this river was obstructed by a bar, over which not more than 3 feet of water could be found. The effects of the piers were to increase this depth to 6 feet, and a violent freshet of this year further increased it to 9 feet; but it is doubted if these additional 3 feet will be a permanent improvement, unless the piers are extended as proposed, and in accordance with the original plan. The work was commenced in 1837. $53,626 have been expended upon it, and its commerce for 1846 is reported at $137,770.

Huron harbor, mouth of Huron river, 20 miles west of Vermillion. The entrance of this harbor was also in its original state obstructed by a sand bar, very shoal and occasionally dry, but since the construction of works for its improvement, a depth of 10 feet over the bar has been obtained and secured. Repairs and a further extension of the piers into the lake are required. The work was commenced in 1826, and has had expended upon it $45,773. Its commerce in 1846 was $.

Sandusky harbor or Sandusky bay.—This is a very important harbor, its entrance about 10 miles west of Huron. The bay is very large, with a depth of 12 feet, occupying at the western extremity of the lake a position similar in importance to that of Erie, at the eastern end. The entrance to the bay is sufficiently deep, but winding, intricate, and dangerous, so as to be comparatively inaccessible in storms from these causes, and from the violent surf which at such times breaks over the bar. Surveys, plans, and estimates made to remedy these evils have been submitted, but no appropriation has yet been granted. The appropriation of $15,000 made in 1844, was to stop a breach which the sea had made through the western extremity of peninsula point, endangering the entrance to the bay. The appropriation was not sufficient to complete the work, and it yet remains unfinished.

The commerce of this place exhibits the extraordinary advantage of opening good communications with the interior. It was only during a part of 1846 that it had the benefit of the Cincinnati, Springfield, and Sandusky railroad, which nearly doubled its export and import trade, raising them to the large amount of $5,943,177.

The Lake Erie coast of the State of Michigan embraces about 35 miles. There is but one harbor of notoriety within this limit, namely, Monroe; but, near the southern borders of the State, so near that it is in fact a harbor for the accommodation of that State, as well as of the State of Ohio, in which it is situated, is another good harbor, namely, Toledo. At one of these, Monroe, government operations for its improvement have been made. It is situated about 40 miles northwestwardly from Sandusky, and about 30 miles southwardly from the entrance to the straits of Detroit, and forms the entrance to the river Raisin. Before the construction of the works to improve the entrance of this river, but three feet of water could be found over the obstructing bar, but since the construction of the

works, 10 feet has been obtained and secured. The first appropriation in this case was in 1835, and the total amount, up to this time, is $110,000.

The work at this place has been costly, in comparison with many others, as, in addition to the piers extended into the lake, it required the construction of a canal through a sandy beach and a deep marsh; but results have fully sustained the judiciousness of the plans.

Toledo or Maumee is about 16 miles southward from the river Raisin. No government expenditures have been made for the improvement of this harbor.

The river-lake coast of the State of Michigan, embracing the straits of Detroit or Detroit river, is about 28 miles. This river is a good harbor throughout, and no improvements have been contemplated there by the general government, except to open a better passage at its southern extremity, near lake Erie, through the channel on the American shore, for which surveys, plans, and estimates have been submitted.

The total amount of expenditures on lake Erie for the improvement of its harbors is $1,348,249 24, and the total amount of its commerce, (exports and imports,) in 1846, $94,358,350.

LAKE ST. CLAIR.

The whole of the American coast of this lake (about 35 miles) is within the State of Michigan. No surveys, plans, or estimates have ever been made in reference to any harbor improvement on its coast; the views of the general government upon this lake having been limited to plans for improving the passage over the St. Clair flats. For this last, surveys, plans, and estimates have been made, but no appropriation has yet been granted.

The pass over these flats is of extreme importance to the lake trade, and the embarrassment encountered there so serious, that, during the course of last summer, (1846,) the Steamboat association undertook, at their own expense, and with the use of the United States dredge boat, to open a passage of adequate depth over the flats; but their funds or arrangements were insufficient, and the work was abandoned. The operations, however, developed an extremely interesting fact—that the flats were not a recent deposit, but consisted chiefly of an indurated marl. The removal of such a material is more difficult than the removal of recently deposited mud, and more costly; but the advantages in such an obstacle over a recent deposit are in the great probability that a passage, once opened, will remain open an indefinitely long period, requiring very little future work, as the occasional deposit from the waters of so clear a lake must be extremely small, and the probability is very great that the current which would exist through the pass after it was dredged to a proper depth would ever prevent any deposit being made. The straits or river St. Clair is 36 miles, the whole of the American shore being within the State of Michigan.

Like Detroit river, this river can be considered as a good harbor throughout its whole length.

The river St. Clair forms the link of connexion with lake Huron; and the whole of the American coast of this lake, embracing about 440 miles, is within the State of Michigan. Our surveys have not been sufficiently extended to justify any remarks in reference to the condition or existence of harbors on this long line of coast; nor has the settlement or wants of this coast yet called for any improvements upon it. It is, comparatively, an uninhabited coast.

Five hundred and sixty miles of the coast of lake Michigan are within the limits of the State of Michigan. Upon this coast our surveys have been more extensive, developing some fine harbors, or river outlets. Of these, however, our investigations have not as yet been sufficiently minute to justify opinions of the capacities or wants of many of them. I shall, therefore, limit myself to enumerating such as have been surveyed.

Grand river—a fine, bold, deep, and extensive river. The entrance and bar have been surveyed, and the plans and estimates for the improvement digested; but, as yet, there has been no appropriation for any work there.

Kalamazoo.—The remarks upon Grand river apply equally to the Kalamazoo.

St. Joseph river, also a fine and extensive river, having about 60 miles of small steamboat navigation from its mouth, and extending far into the State, with navigation for common boats. Its entrance was obstructed by a sand bar, over which, in common blows, the lake broke with great violence, and which did not afford, on the most favorable occasions, more than five feet of water. Thirteen feet of water can now be carried from the lake to the shelter which the piers afford; after which, not less than eleven feet is carried to the landings of the town. The first appropriation for this harbor was in 1836, and the total amount expended upon it has been $131,113. It has been a costly and difficult work. The whole of this side of the lake is exposed to all the severity of its frequent storms from the west, requiring the piers to be very strong, and exposing the work, while in progress, to frequent and serious disasters. The piers are now in much need of repair, and require a further extension into the lake, particularly the northern pier, in order to afford a better protection to the entrance by aiding as a breakwater.

New Buffalo, near the southern boundary of Michigan.—Nothing has been done at this place, except to make the survey, plan, and estimate.

State of Indiana.—This State possesses about 40 miles of Lake Michigan coast. It is doubted if more than one harbor can be made on this line of coast, namely, the harbor of Michigan city, upon which government has been operating. There is a great necessity for a harbor on this part of the coast, as it is the last resort of vessels which have failed to find shelter in any of the ports to the north.

The entrance to this harbor was originally so obstructed, as not

to afford at times a passage for a row-boat; never to afford more than two feet water; and, from many undoubtedly correct representations, the passage was occasionally entirely closed. The good effects of the piers were soon manifested; and, at this time, eight feet of water can be carried from the lake to the shelter of the piers. The work was commenced at this place in 1836, and the total amount expended there has been $135,733.

Illinois coast of Lake Michigan.—The coast of the State of Illinois, upon this lake, embraces about 60 miles; within this distance there are three harbors.

1st. *The Kalymik*, formed by the outlet of Kalymik river into the lake.—Nothing has ever been done at this place, except to make the survey, and the plan and estimate for its improvement. It could be rendered a good entrance for first class lake steamers; and its position is so near the boundary-line of Indiana, that it can, with propriety, be considered a harbor for the two States of Indiana and Illinois.

2d. The lake shore now trends decidedly to the north; and about 11 miles from Kalymik is Chicago.

Chicago is the most southern port on the western shore of Lake Michigan. Appropriations were first made in its favor in 1833; and the total amount expended for its improvement is $247,601.

The report of the first government survey of Chicago river, and its entrance into the lake, states: "the river is about 50 yards wide, affording a depth of at least 12 feet everywhere for three or four miles, except at its mouth, where a sand bar is formed, which generally prevents any access to it, except by small boats and canoes."

Such was the condition of this entrance when the government commenced its works of improvement there. By these works, it has been made one of the most safe and best entrances on the lakes, having now never less than ten feet of water over the bar. The piers, however, require repairs, and, in some parts, to be raised; and the pass between them, at places, requires the use of the dredge-boat; for all which, plans and estimates have been submitted.

Its commerce for 1846 is reported at $3,927,150.

3d. *Little Fort, about 38 miles north of Chicago.*—It would be fortunate for the commerce of the lakes if a harbor could be made at this place; but it is doubted if one can be. The difficulties do not consist solely in a bar at the entrance; for difficulties of this kind have universally yielded to our efforts. But there is no depth of water after entering the creek. A good landing, to accommodate its trade, and for steamboats, could be made, by extending a well-constructed bridge-pier into the lake; which is the most, in my judgment, which can be done, or should be attempted at this place.

North of Illinois lies Wisconsin, at present a Territory.

The Wisconsin coast of lake Michigan embraces about 320 miles, including the extensive coast of Green Bay. This bay has been thoroughly surveyed by the late Captain Williams, who fell in the attack on Monterey.

Exclusive of Green Bay, the lake coast of Wisconsin is about 200 miles; in which distance there are several harbors.

Proceeding north from Illinois, the first harbor is *Southport*, about sixteen miles from Little Fort, and about seven miles from the boundary of Illinois. It is, therefore, adapted to much of the trade of the State of Illinois, as well as of Wisconsin; and as it is the first place on this shore of the lake, north of Chicago, (and distant from it 56 miles,) at which a harbor can be made, it becomes a place of importance to the general trade of the lake, as well as to the trade of its immediate vicinity.

Its entrance was obstructed by a bar, at times entirely closed, and never with more than two feet of water over it. Works for its improvement were commenced in 1844; a second appropriation was made in 1845; and the total amount expended is $27,500.

As there is a sufficient depth and capacity in the creek after crossing the bar, I have no doubt that a good entrance can be made; but as yet the works have not been sufficiently extended to produce permanent advantages. Occasionally, there has been six feet of water over the bar since the works were commenced; but, for the want of a greater extension of the piers, it soon relapses to its former condition.

Racine, ten miles from Southport.—Private enterprise had already done much to improve the entrance to this harbor before the government extended its patronage to it. The original condition of the entrance did not admit of more than two feet of water over the obstructing bar; but the effects of the works to improve the pass have been to increase the depth to 9½ feet.

Milwaukie, twenty miles north of Racine.—The greatest depth of water found on the Milwaukie bar was four feet, and often much less. There is now, from the works which have been erected there, a permanent depth, at the entrance, of 11 feet. The first appropriation made for this harbor was in 1843; and the total amount appropriated is $50,000. The piers require repairs, finishing, and further extension; and the dredge should be used on a part of the channel within the piers.

These are the only harbors, namely—Chicago, Southport, Racine, and Milwaukie, on the western shore of Lake Michigan, upon which the government has made expenditures. But, from Milwaukie to the entrance of Green Bay, (about 150 miles,) there are no harbors, except such as nature has made. In this distance, however, there are two positions admirably adapted for improvement, and capable of being made harbors for first class lake steamers.

The first of these is *Sheboygan*, 50 miles north of Milwaukie, with about four feet of water over its bar. The second is *Manitowoc*, 25 miles north of Sheboygan, with about five feet of water over its bar. Both of these places have a capacious and deep water-way after passing their obstructing bars. Nothing has been done at either but to make surveys, plans, and estimates. These harbors are extremely essential to the commerce of the lakes, as steamboats, after leaving the Manitou islands, make for the western

shore of the lake; but, at present, find no harbor or port of refuge short of Milwaukie, 160 miles from the islands by the shortest line.

In addition to the lake coast, (which has been stated as within the several States and the Territory of Wisconsin,) there is an extensive line of coast within what is usually denominated the upper peninsula of the State of Michigan, embracing about 800 miles. It consists of part of the northern coast of Green Bay and part of the northwestern coast of Lake Michigan, and of Lake Huron, and nearly all of the southern coast of Lake Superior. We know but little of this extensive line of coast from actual survey, and, therefore, cannot speak correctly of the protection which its harbors afford, or of the number of these harbors.

Copper harbor, on Lake Superior, (now occupied as a military post,) is an excellent harbor, requiring no artificial aid. Within the Territory of Wisconsin, there is also about 90 miles of the southern coast of Lake Superior, and about 140 miles of the northern; of which as yet, from actual survey, we know but little.

The total amount of expenditures for harbor improvements on this lake, (Michigan,) is $604,447 59.

I am not able to state the amount of the commerce of this lake. Our information refers only to the port of Chicago—and, for that port alone, the exports and importsof 1846 amounted to $3,927,150.

A reference to the table in the previous part of this report will give the exports and imports of any particular place on either of the lakes, as far as information has been received.

8.—"*Means of communicating in the British provinces, by roads and canals, with their ports and harbors on the lakes, and the condition of the latter.*"

Our information on these subjects is, in many respects, defective; but there was no appropriation, out of which the expenses of an agent employed to obtain it could have been paid, or out of which a proper compensation could have been awarded for his services. Much valuable information could, without doubt, be obtained by employing a suitable agent. No secret agency is alluded to. The mere liberty of travelling over the different canal lines, examining their locks, and of visiting the different ports and harbors—a liberty denied to no one—are all the privileges which a properly informed person would require in order to obtain the desired information.

Existing canal connexions have established a line of communication between the upper lakes and the St Lawrence, at Montreal, from whence the communication is open to the Atlantic. Those canal connexions are formed by the Welland and other canals, which will be briefly described.

1st. *The Welland canal.*—This canal unites lake Erie, and thence all the lakes above, with lake Ontario. It is 28 miles long, 81 feet wide at top, 45 feet wide at bottom, and 8½ feet deep. It has 31 locks, each 150 feet long and 26½ feet wide in the chamber, with a depth of 8½ feet over the mitre sill. Total lockage 328 feet. It

has two entrances into lake Erie: one by Port Colburn, 20 miles west of Buffalo, and one at Port Maitland, 18 miles west of Port Colburn. Port Maitland is said to be open to the lake trade—that is, free of ice—about two weeks earlier than either Port Colburn or the American port of Buffalo. The canal is completed and in use to Port Maitland, at which place there is a steamboat dock. The connexion with lake Ontario is at Port Dalhousie, about 15 miles west of the mouth of Niagara river. It also has a connexion with Grand river, at Danville, by which the trade of that fine river is connected with both lakes Erie and Ontario.

I am not able to describe the ports which constitute the points of junction between this canal and the lakes, but without doubt they have been so selected as, naturally or artificially, to admit of vessels which the canal can pass. Extensive works of protection and improvement are now in progress at Dalhousie.

The Welland canal is the only line of water connexion, on the Canada side of the lakes, between the upper lakes and lake Ontario. Its facilities depend upon the dimensions of its locks. These are inadequate to the passage of steamers of 400 tons and upwards, as the lake navigation requires more length and more breadth for its steamers than are generally given to boats of the same tonnage for sea service, in order to compensate for the less draught of water of the lake harbors generally.

2d. *The Rideau canal, connecting Kingston, on lake Ontario, with the St. Lawrence, near Montreal.*—It passes through a chain of lakes to the Rideau river; thence, by that river and the Ottowa, to Bytown; thence, by Ottowa river and the Greenville and other short canals, to the St. Lawrence, near Montreal. The distance from Kingston to Bytown is 127 miles; of which, 70 is by slack-water (river and lake) navigation. The locks on the Rideau part of the route are 127½ feet long, 46 feet wide, and 5 feet deep over the mitre sill; the number of locks 46, and the amount of lockage 447 feet. On the Ottowa part of the route, the Greenville canal further restricts the usefulness of this line, as the locks on this part are 110 feet long, 30 feet wide, and 5 feet deep over the mitre sill. From Bytown to Montreal, the distance is 120 miles; making the total distance from Kingston to Montreal, by this route, 247 miles. This being an interior line, and, consequently, exempt from disturbance, is a safe and valuable line for the transportion of men and supplies, but can with propriety be viewed only as a boat line, as its locks will not admit of the passing of any vessel drawing more than about 4½ feet water, and of a length exceeding 100 feet.

3d. *The St. Lawrence canals.*—These are short canals, in the immediate valley of the St. Lawrence, and can with propriety be considered as parts of a system of lock and dam navigation of the St. Lawrence, from Kingston to Montreal.

The total canal length of the several parts is 40 miles; total number of locks 27; total lockage 204 feet. All the locks are of the same dimensions, namely, lock chamber 200 feet long, 45 feet wide, 9 feet deep over the mitre sill. The canal length of 40 miles

is divided into six distinct short canals, and the whole distance by this route from Kingston to Montreal is about 200 miles.

It is clear, from the dimensions of these canals and locks, that an inland navigation now exists, adequate to the service of first class lake armed steamers, from lake Ontario to Montreal, on the St. Lawrence.

4th. The water communication between lake Champlain and the St. Lawrence is by means of a lock and dam at St. Ourse, on the river Richelieu, 12 miles above the entrance of that river in the St. Lawrence. From St. Ourse, the river is used to the Chambley canal, which is 12 miles long, and has 9 locks. These locks are 124 feet long, 24 feet wide, and 6 feet deep over the mitre sills. This canal connects with the river Sorrel or Richelieu, near St. John's, from which, by means of that river, the water communication is accomplished with lake Champlain. Boats of about 100 tons are as large as can be conveniently passed through locks of these dimensions.

There is also a railroad, 16 miles long, from St. John's to La Prairie, on the St. Lawrence, opposite Montreal.

A very simple but very useful kind of road has been extensively introduced in Canada, called "Plank road," less durable, of course, than the Macadam road, but much cheaper, easily made and in a short time, well adapted to that climate, and to the condition of all new and heavily timbered countries. These roads are made of thick plank, laid upon sleepers or longitudinal string-pieces placed upon the graded surface of the road. The plank are nailed to the sleepers; a thin layer of gravel is thrown over the plank; and roads of this kind, according to experience in Canada, will last from 10 to 12 years.

I am disposed to consider these roads admirably adapted to our western and southwestern States, where the soil is loamy, and where the usual roads are liable, during wet seasons, to become in a measure impassable. Those regions are generally overloaded with timber, which could not be better applied, and, with the well-known "travelling steam saw-mill," the timber could be prepared, and the roads made, at a trifling cost. They would be a great saving to the transportation expenses of the country, and would establish good lines of intercourse where, during wet seasons, it may with propriety be said that none now exist.

I cannot state the extent to which these roads have been adopted in Canada, nor, in consequence, the facilities they afford. It is equally out of my power to report upon the lake harbors of Canada, natural or artificial, in a manner sufficiently precise to deserve confidence, or to sustain deductions of their capacity, or of the facilities they afford, and are capable of affording, to the commerce of the lakes. The information is extremely valuable, and should, I think, be obtained. Our lines of communication, harbors, and public works, are open to the inspection of every traveller. We desire no greater privilege in visiting foreign parts, as minds properly informed know to what subjects attention should be directed, and what details should be collected and examined.

But such investigations are often attended with serious expenses. Officers can seldom be sent upon them, as the laws deny to the Executive a power of making any allowance to meet their extraordinary expenses; and civil agents cannot be employed, as there is no appropriation out of which they can be paid for either expenses or services.

9.—"*Adaptation of the British commercial means of the lakes to purposes of military operations generally.*"

Those means, without doubt, eminently consist of the facilities which the general population of the country, and population concentrated in towns, can furnish. Wherever a harbor is made, population concentrates. The adjacent country becomes thickly inhabited and better cultivated; manufactures spring up; artizans of all kinds assemble; workshops are established; provisions are collected in store-houses; and all those facilities to military operations belonging to population, to supplies of all kinds, and to mechanical means, are at command. What these are on the Canada side of the lakes, is not in my power to say, as I have no reliable data on these subjects. I have, therefore, of necessity to confine myself to the rigid commercial means, and to the facilities of transferring those means from lake to lake, and from lake to river.

The upper lakes, or lakes above the falls of Niagara.

The British tonnage on these lakes is represented to be 4,250.

These facilities for military operations on the upper lakes cannot be much aided by the tonnage of Lake Ontario, as the Welland canal, which connects these lakes, is not adapted to pass a military marine; and, for military purposes, its power may, I think, be considered as limited to the transportation of men, materials, and supplies.

The locks of this canal, by which its capacity should be measured, are (in the chamber) 150 feet long, 26½ feet wide, and 8½ feet deep over the mitre sill. Now, if we take for the dimensions of an armed steamer those of the American armed steamer Michigan, adapted to the navigation of the lakes, and capable of entering the lake harbors, we find them to be: length between the perpendiculars, exclusive of bowsprit, 162½ feet; breadth of beam, exclusive of wheel-houses, 27 feet; draught of water, 8¼ feet; burden, 500 tons. The draught is to be remedied by unloading, but the length and the breadth of beam cannot be avoided; and these render such a canal useless for the passing of a boat of such dimensions. And from the dimensions, length, and breadth of beam usually given to lake steamers of 400 tons, I feel justified in saying that the locks of the Welland canal will not admit of their passing. Whatever, therefore, may be the preponderance of the British Lake Ontario tonnage, in comparison with the American tonnage of that lake, steamers of adequate dimensions to carry a heavy armament cannot be transferred from that to the upper

lakes, and cannot, therefore, be counted upon to aid, as a military marine, British power on the upper lakes. Reasoning, therefore, exclusively from the military facilities which the commercial tonnage affords, the command of the upper lakes may be considered as decidedly and exclusively our own.

LAKE ONTARIO.

The British tonnage on this lake is stated at 42,325 tons, divided as follows:

57 steamers,	average tonnage	200	tons.
6 lake propellers,	do	300	"
7 river propellers,	do	75	"
2 ships,	do	500	"
6 brigantines,	do	150	"
94 schooners,	do	150	"
300 barges,	do	40	"

30 small craft, all under 30 tons, average tonnage 20 tons.

Of these 57 steamboats, there are several large boats capable of receiving a heavy armament.

If it be supposed that the mariners which this tonnage employs equal, per ton, to the mariners of the American tonnage, it must employ 2,282 mariners.

The American tonnage of this lake is 23,311, divided into 8 steamers—average 277 tons; 10 propellers—average 275 tons; 204 sailing vessels—average 114 tons—manned by 1,500 mariners of all kinds.

From the foregoing facts, it is clear that, in amount of tonnage, number of steamers, sizes of vessels, kinds of vessels, and number of mariners, the British possess a great preponderance upon this lake; and, reasoning from the facilities for military operations, derivable from commercial means, it must be admitted that the British possess the command of this lake.

The great superiority of British commercial means on Lake Ontario, in comparison with the upper lakes, arises from the great attention bestowed upon the harbors of Lake Ontario, and consequent greater encouragement to commercial enterprise, greater facilities to commerce, and greater development of the agricultural and manufacturing resources of the country.

In addition to the preponderance of British tonnage on Lake Ontario, it may be well to consider the great facilities to be derived from the lock and dam navigation of the St. Lawrence. From the description which has been given of this navigation, it will be seen that armed steamers, fully equipped, of the size of the Michigan, can be passed from Montreal to the lake, and, consequently, that the resources of the St. Lawrence can be made to play a most important part in securing and maintaining the command of this lake to the power which owns the St. Lawrence. Indeed, these two sources of strength—the tonnage of the lake, and the facility of passing armed steamers from the St. Lawrence to the lake, which

the British possess—may be justly considered as giving to that power the military command of Lake Ontario.

Although the Welland canal will not facilitate the passing of armed steamers from Lake Ontario, yet every species of supply of other kinds which Lake Ontario or the St. Lawrence can furnish, can be sent by that canal to the upper lakes; and under this aspect it can be viewed as an extremely important auxiliary to British military operations on the upper lakes.

LAKE CHAMPLAIN.

The connexions between this lake and the St. Lawrence can be viewed merely as facilities for the transportation of men and supplies; yet, however, completely controlled on their entrance into the lake by the American fortifications at Rouse's point. This lake can be considered as exclusively an American lake. A small portion only of the entrance north of Rouse's point, and a small portion only of the shoal Mississquoi bay, forming part of the frontier of Canada. Its tonnage is chiefly American, and the command of t e lake can be viewed as American only. And, unless the command at Rouse's point be lost, no other power than the American can be considered as possessing any facilities for military operations on this lake.

The total American lake tonnage is.....	106,836 tons.
The total British lake tonnage is	46,575 "
Making a combined tonnage of	153,411 tons.

Respectfully, sir, your obedient servant,

J. J. ABERT,
Colonel Corps Topographical Engineers.

Hon. W. L. MARCY,
Secretary of War.